

Berichte
aus dem
Institut für Meereskunde
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Nr. 2

Mean meridional cross-section of the
available potential energy
for each January and July
of the period 1967 until 1972

by
P. Speth

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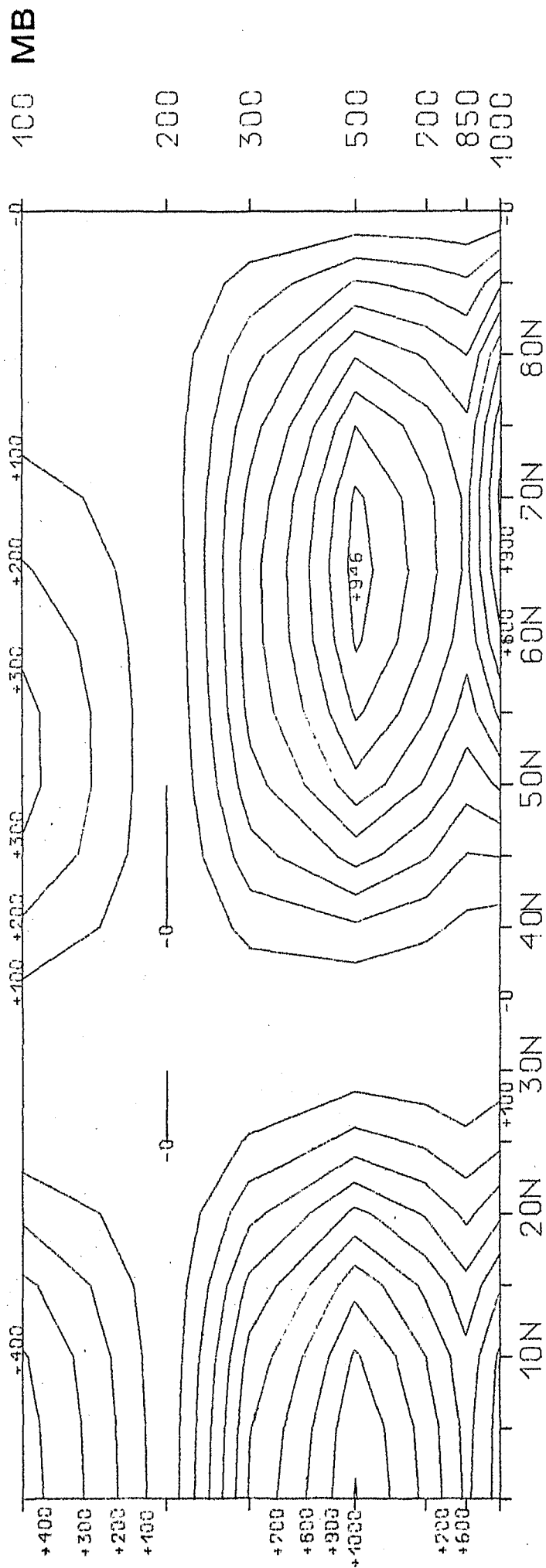
PREFACE

The concept of hemispherically available potential energy was used by P. SPETH (1974) to allow a comparison with similar results of numerical models. The computations were carried out in a mixed space-time domain for January and July 1967 until 1972 using routine analyses of the German Weather Service, Offenbach/Main. As supplement to this study in the present report mean meridional cross-sections are presented for each January and July of the period 1967 until 1972. The calculation-methods and -formulas are given by P. SPETH (1974). The following symbols are used:

A_{MMC}	the available potential energy produced by the mean meridional circulation.
$A_{MSE, 1-15}$	the available potential energy produced by the mean standing eddies (wavenumbers 1 until 15).
$A_{MSE, 1}$	the available potential energy produced by the mean standing eddies (wavenumber 1).
$A_{MSE, 2-3}$	the available potential energy produced by the mean standing eddies (wavenumbers 2 and 3).
$A_{MSE, 1-3}$	the available potential energy produced by the mean standing eddies (wavenumbers 1 until 3).
$A_{MSE, 4-8}$	the available potential energy produced by the mean standing eddies (wavenumbers 4 until 8).
A_{TE}	the available potential energy produced by the transient eddies.
A_{TOC}	the total available potential energy.

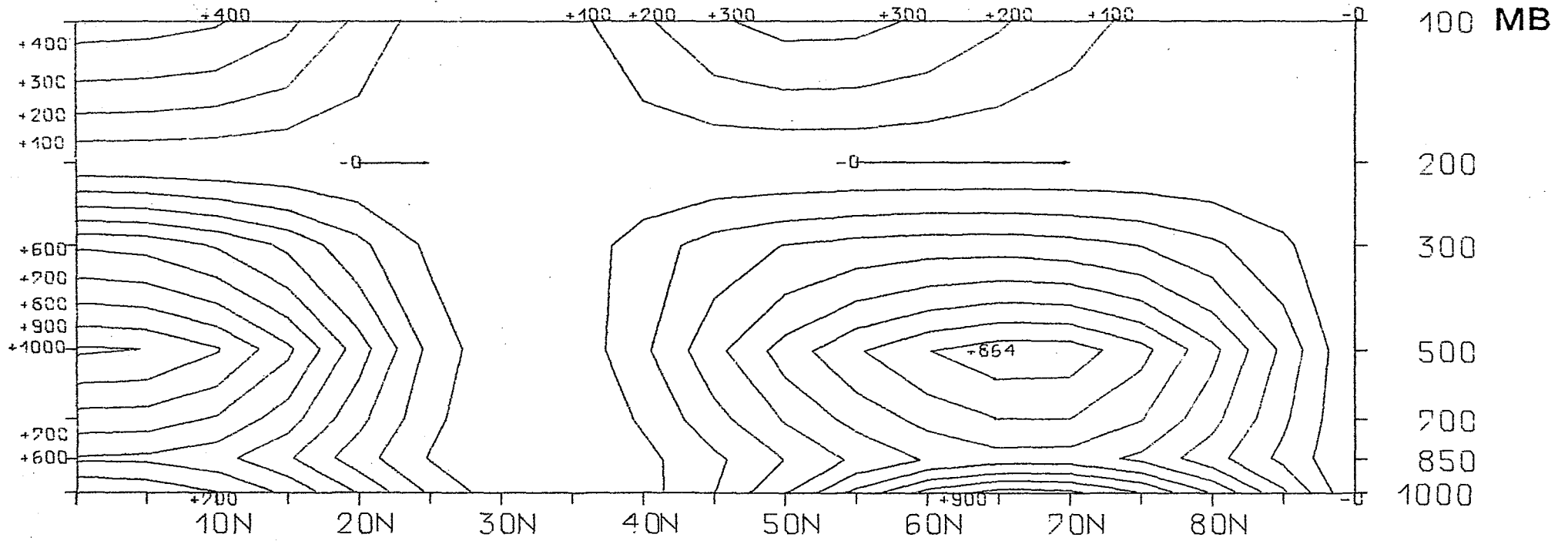
SPETH, P., Energetische Vergleichszahlen für Modellrechnungen der Allgemeinen Atmosphärischen Zirkulation, Meteor. Rdsch. 27, in press, 1974.

KENNZIFFER: 35016700



A_{MMC} $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN. 67

35046800

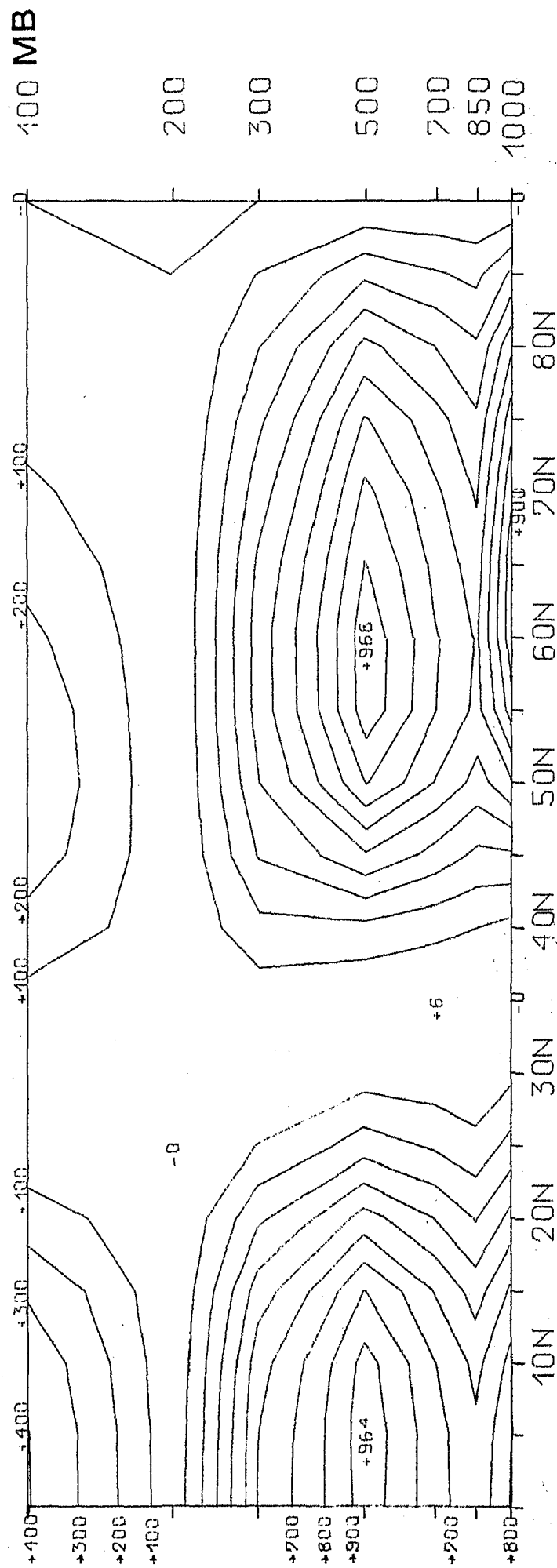


A - MMC

10^{-3} J CM⁻² MB⁻¹ JAN.68

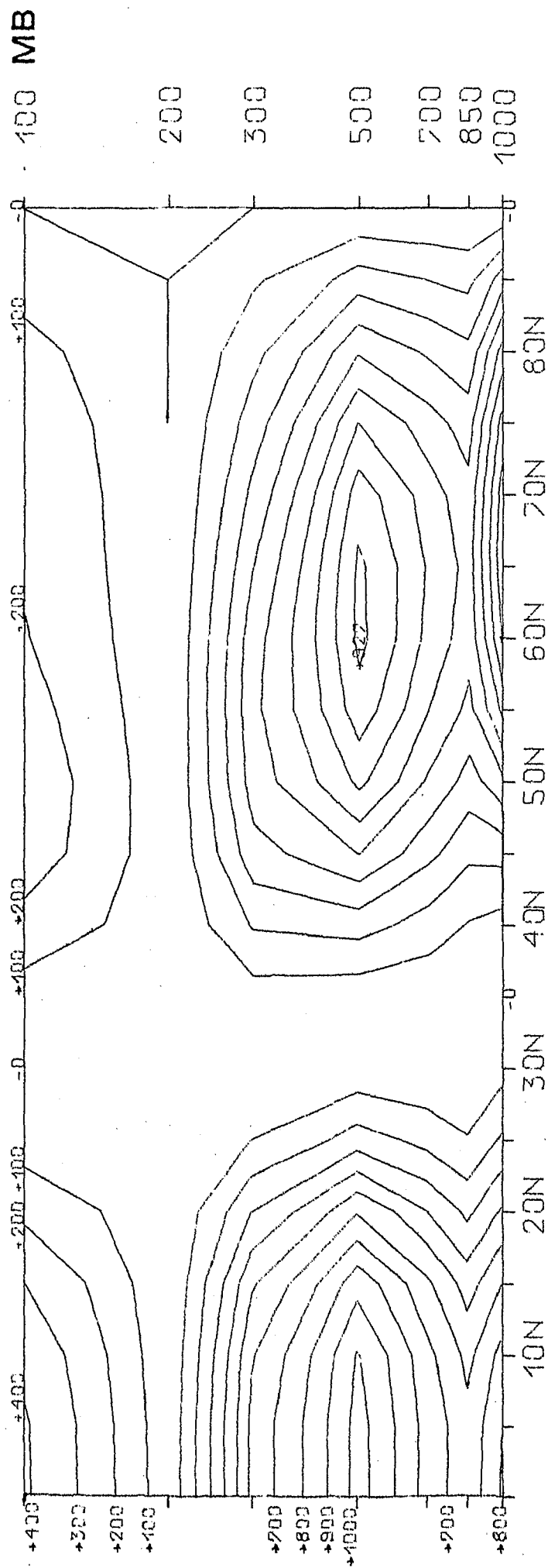
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KENNZIFFER: 35016900



A_{MMC} $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.69

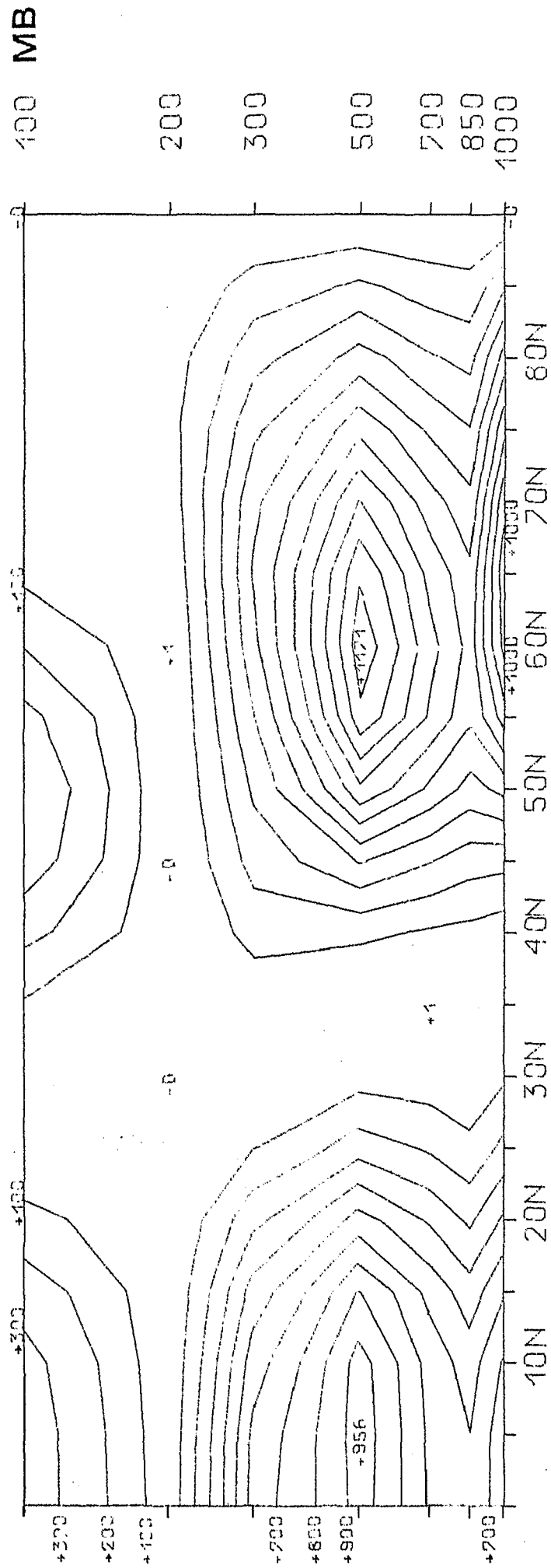
KENNZIFFER: 35017000



A_{MMC} $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.70

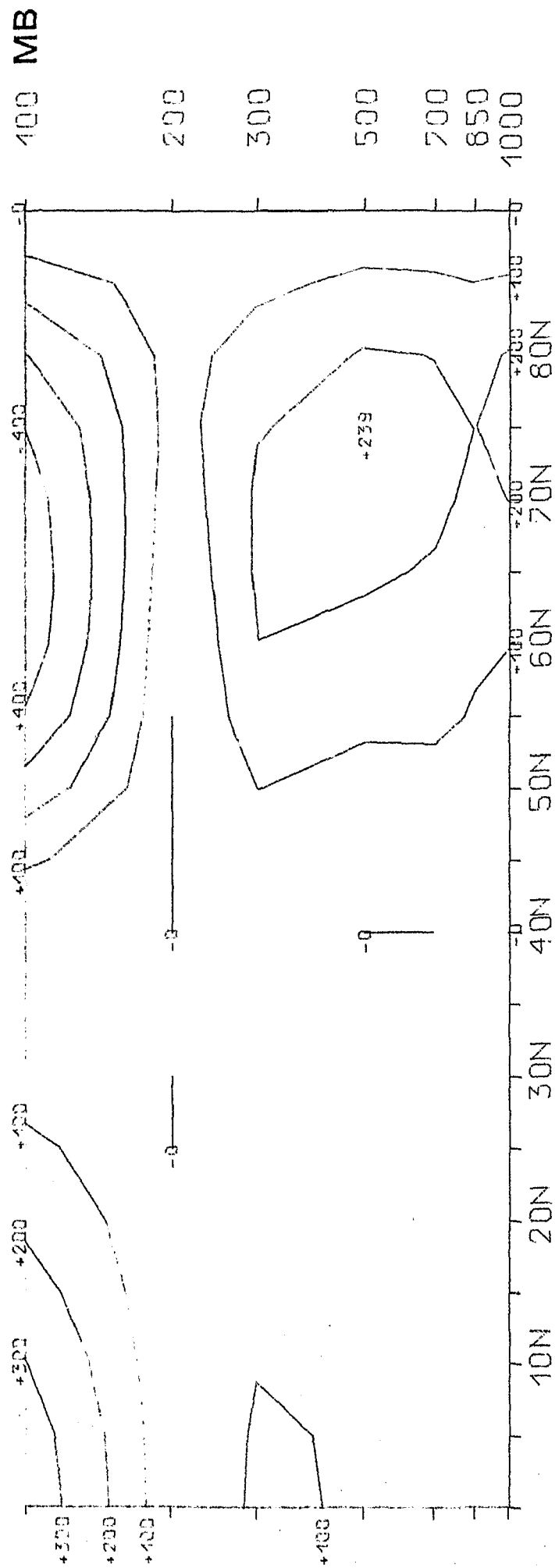
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KENNZIFFER: 35047200



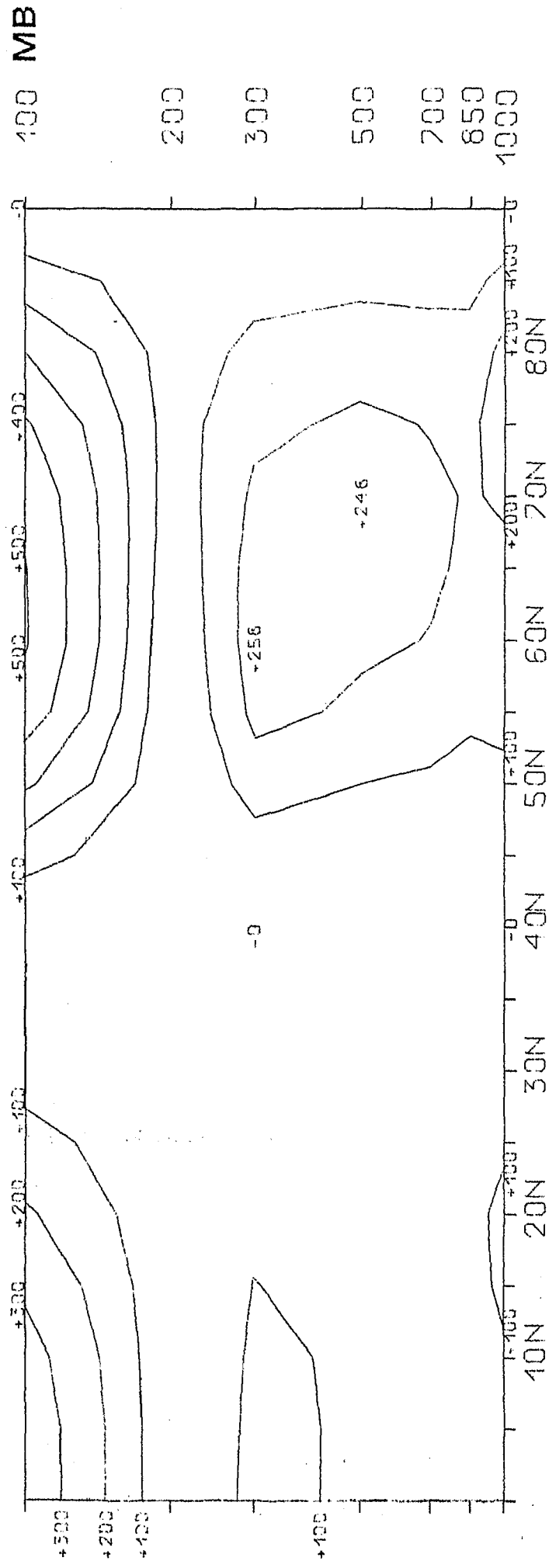
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KENNZIFFER: 35076700



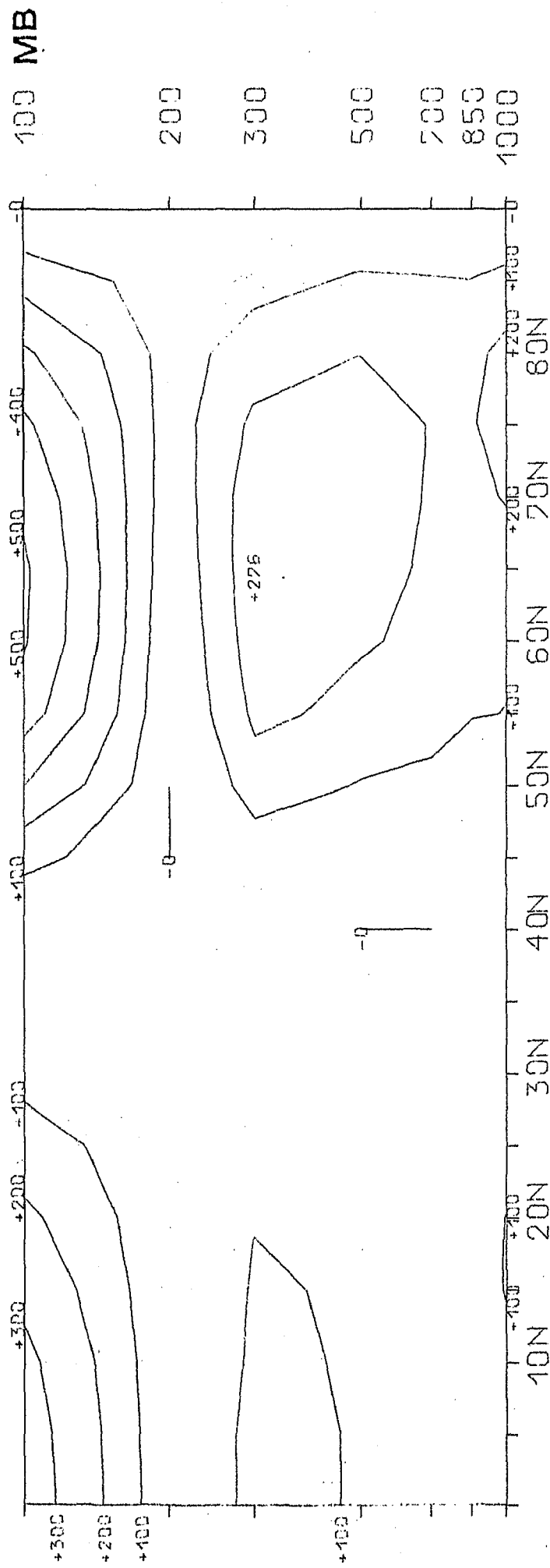
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KENNZIFFER. 35076600



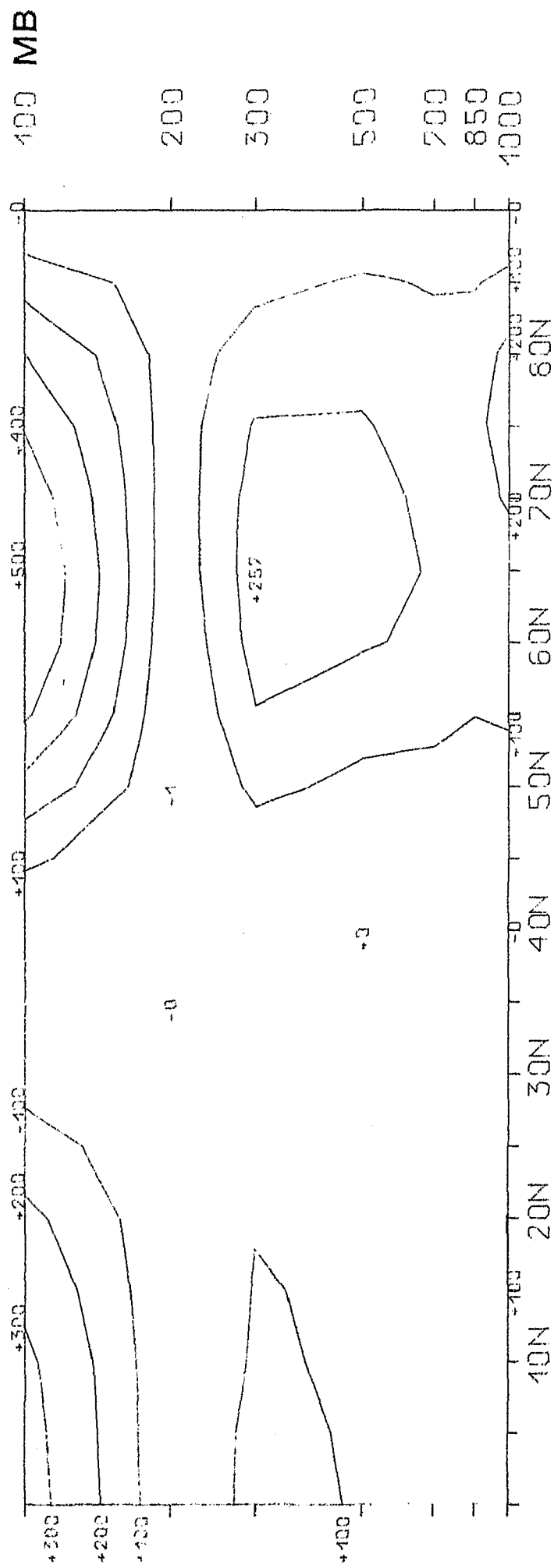
A_{MMC} $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 68

KENNZIFFER: 35076905



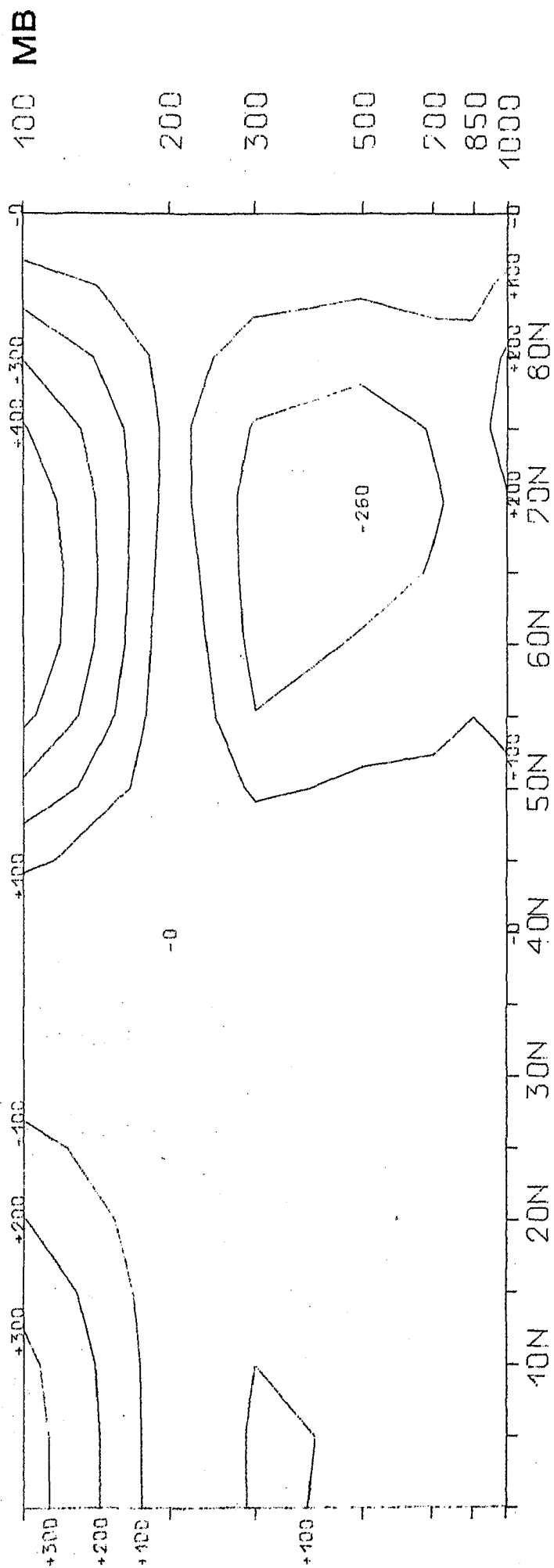
$A_{\text{mic}} \cdot 10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1} \text{ JULI 69}$

KENNZIFFER: 35077000



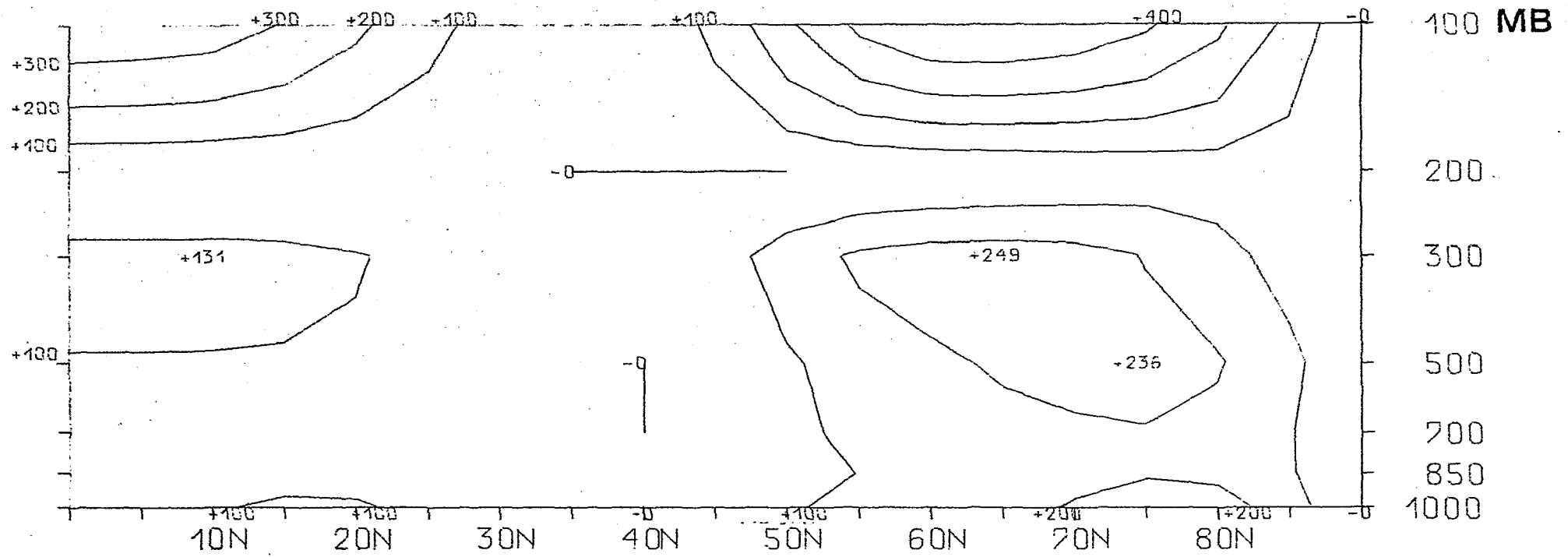
$A_{MNC} \cdot 10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 70

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A_{MMS} $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 71

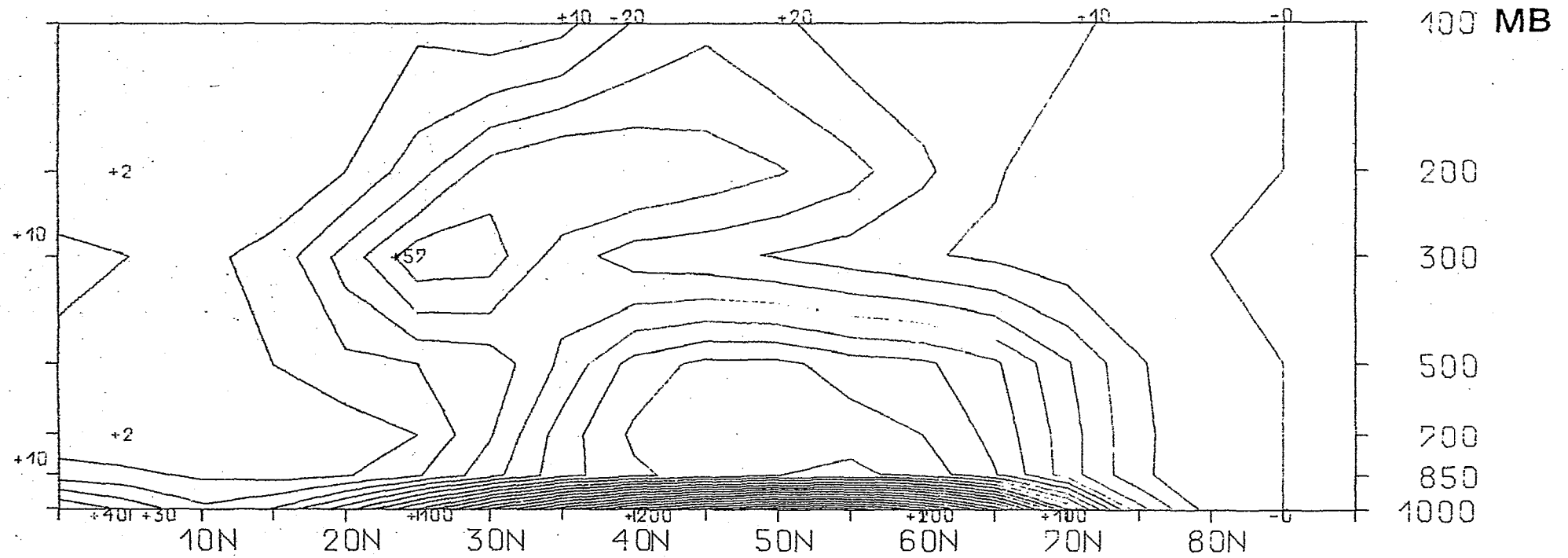
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A_{MMC}

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 72°

KENNZIFFER: 36016200

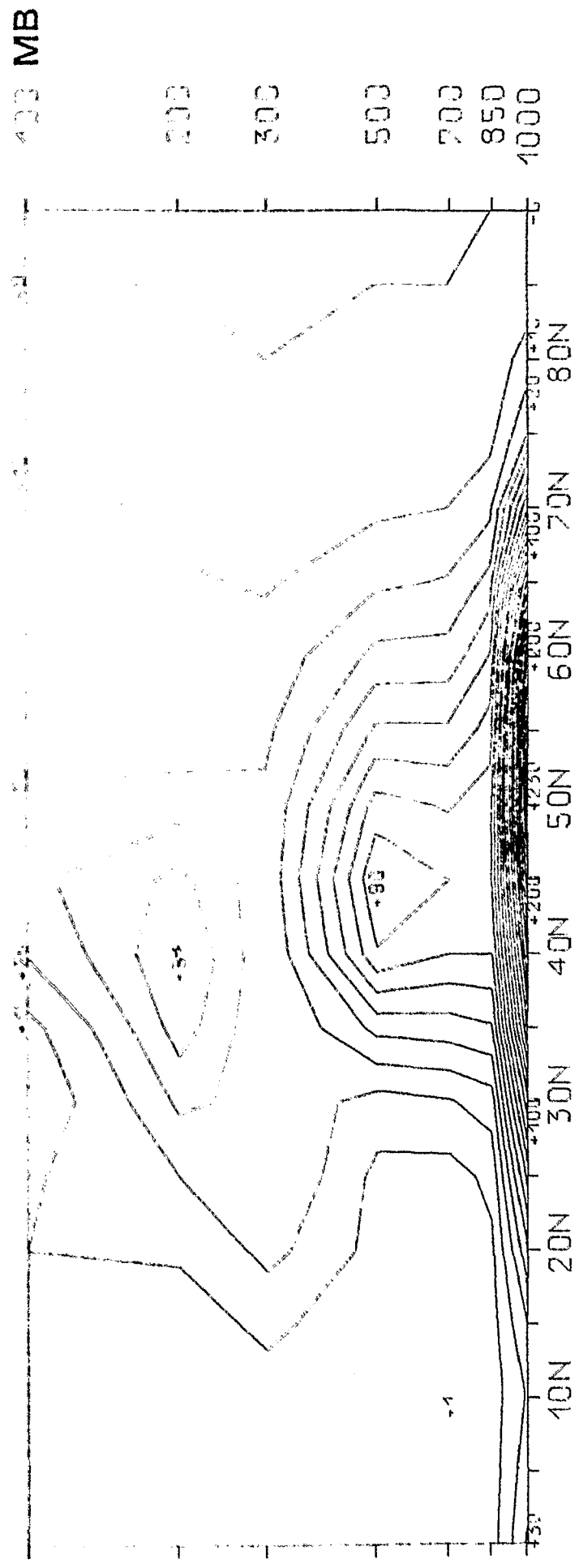


A
MSE, 1 - 15

10^{-3} J CM⁻² MB⁻¹ JAN. 67

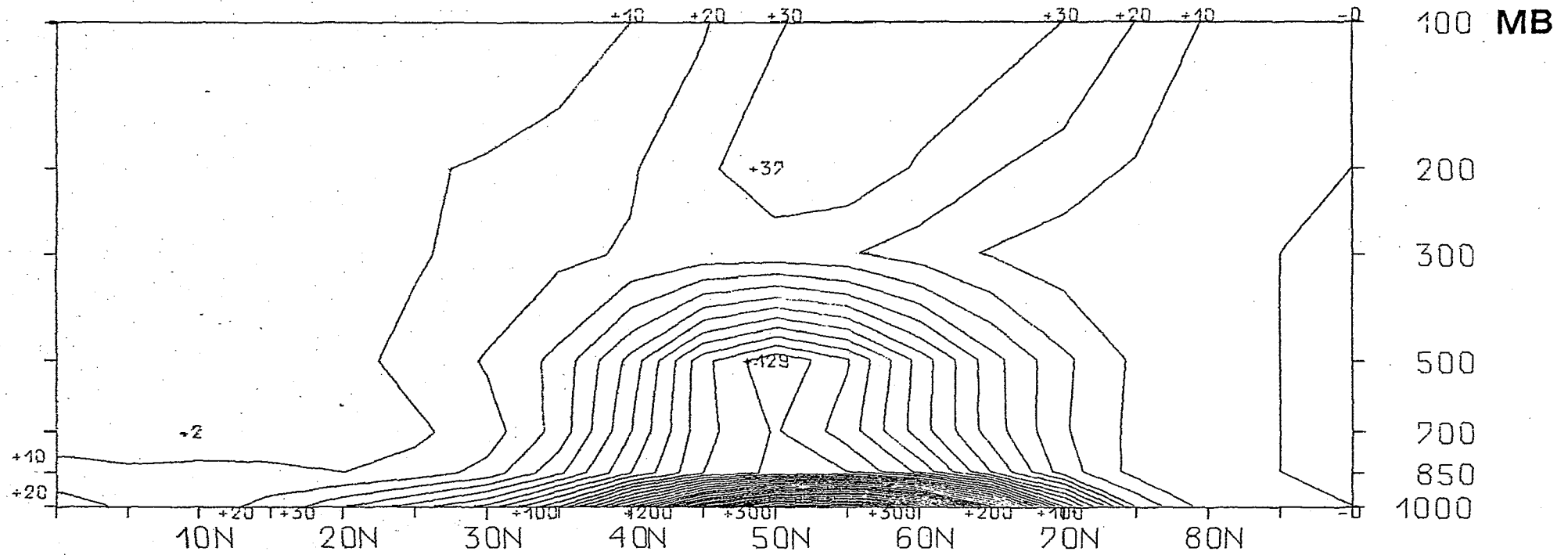
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1000 MB 200 MB 300 MB 500 MB 700 MB 850 MB 1000 MB



$A_{MSE, 1-45}$ $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.68

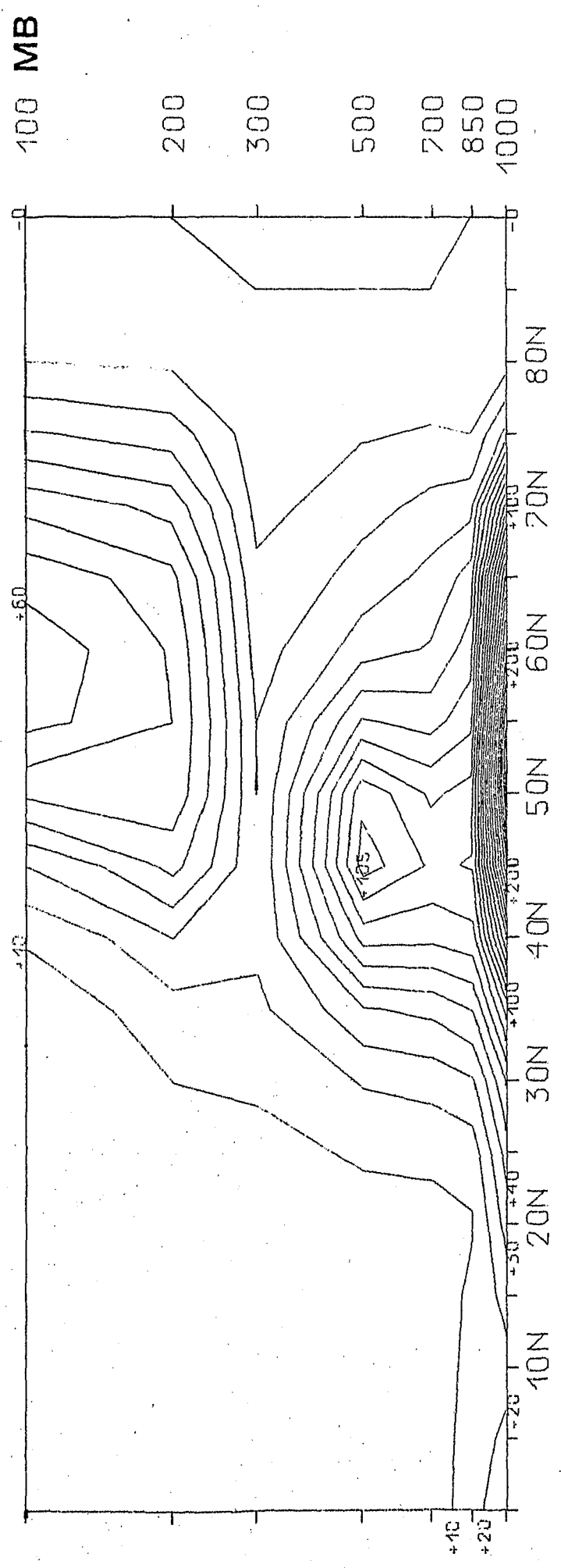
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A
MSE, 1 - 15

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.69

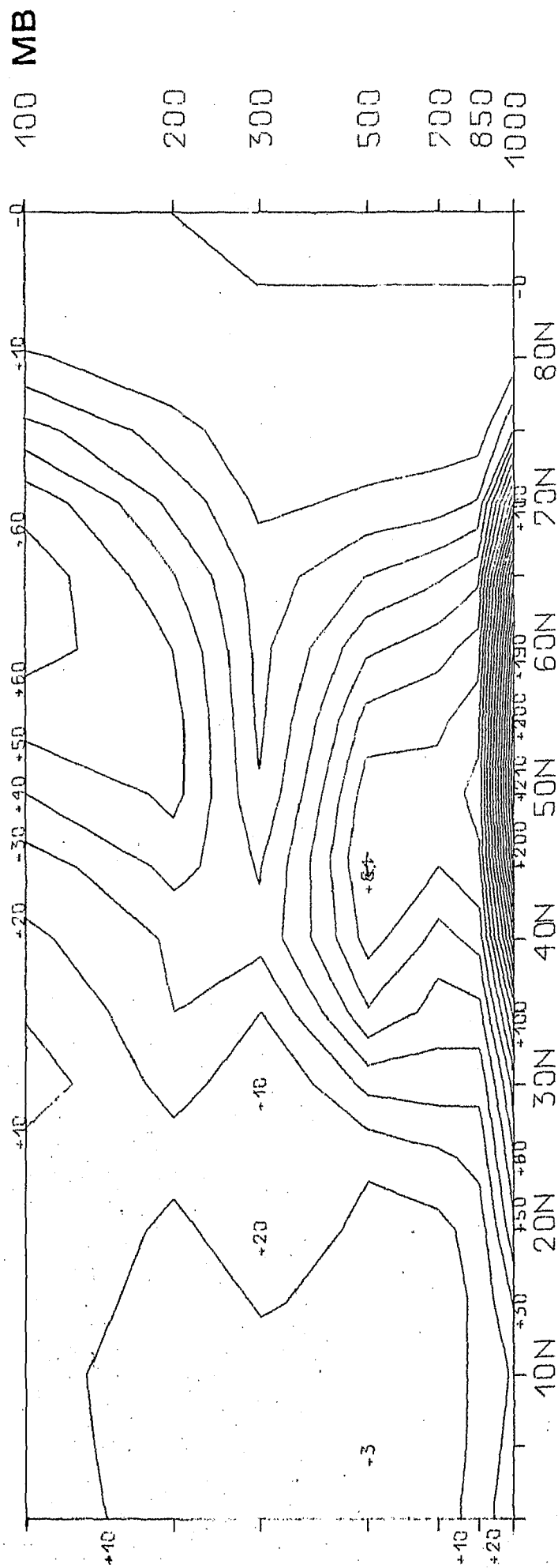
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$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.70

$P_{\text{MST}}, 4 - 15$

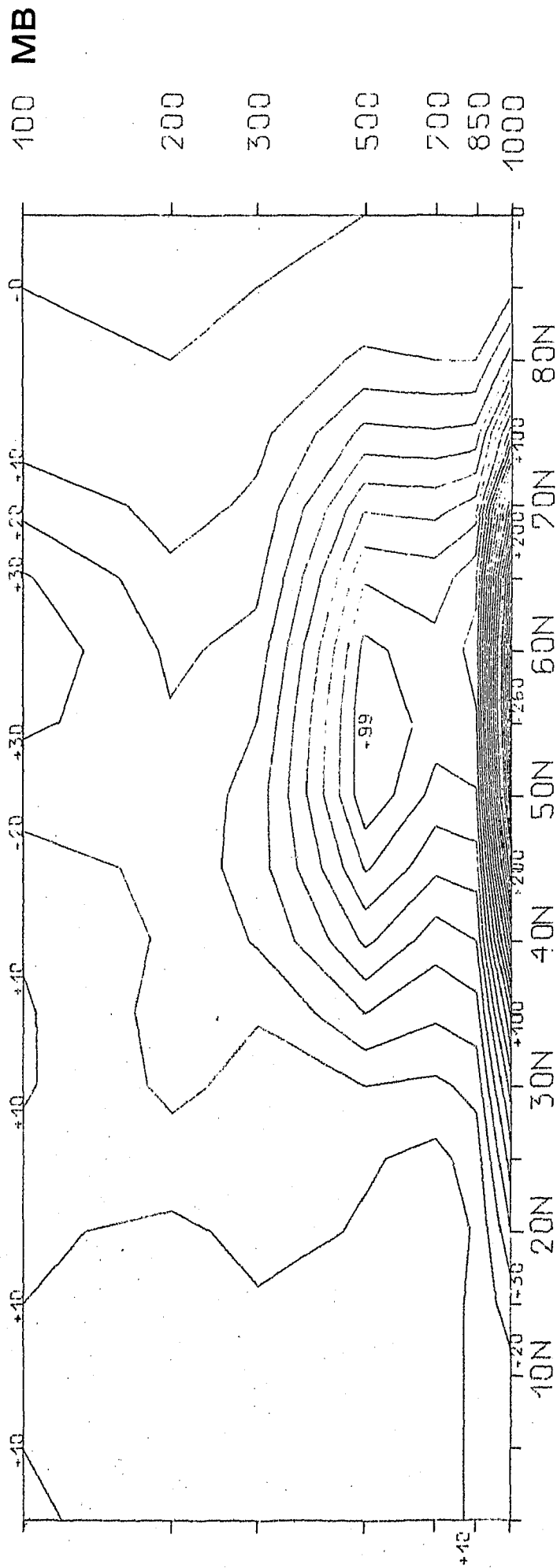
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$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.71

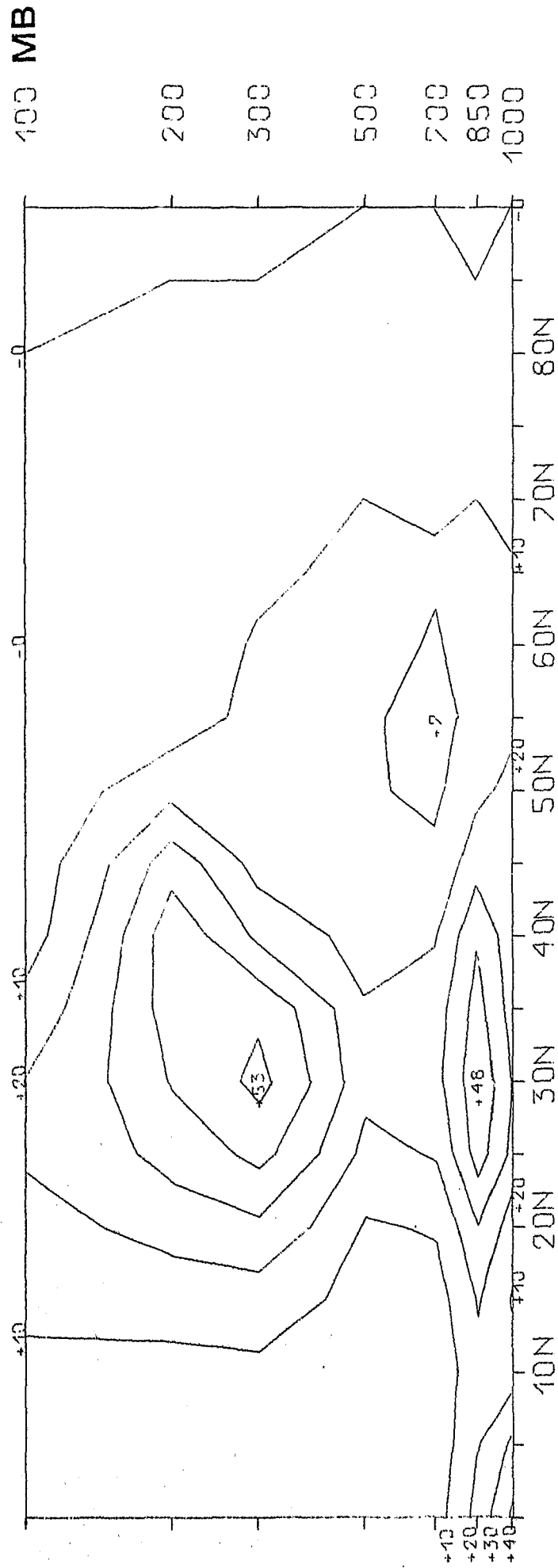
$A_{\text{MSE}, 1-15}$

KENNZIFFER 36017200

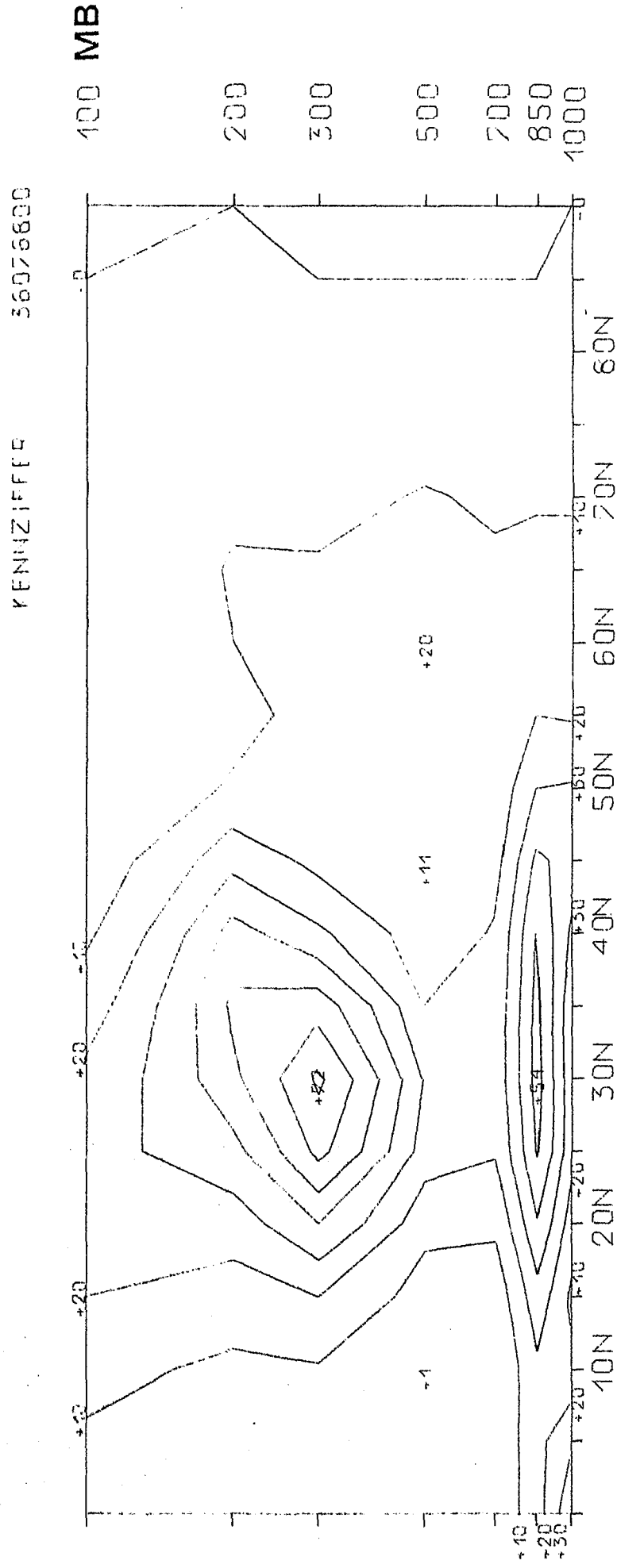


$A_{MSE, 1 - 45}$ $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.72

KENNZIFFER. 36076700

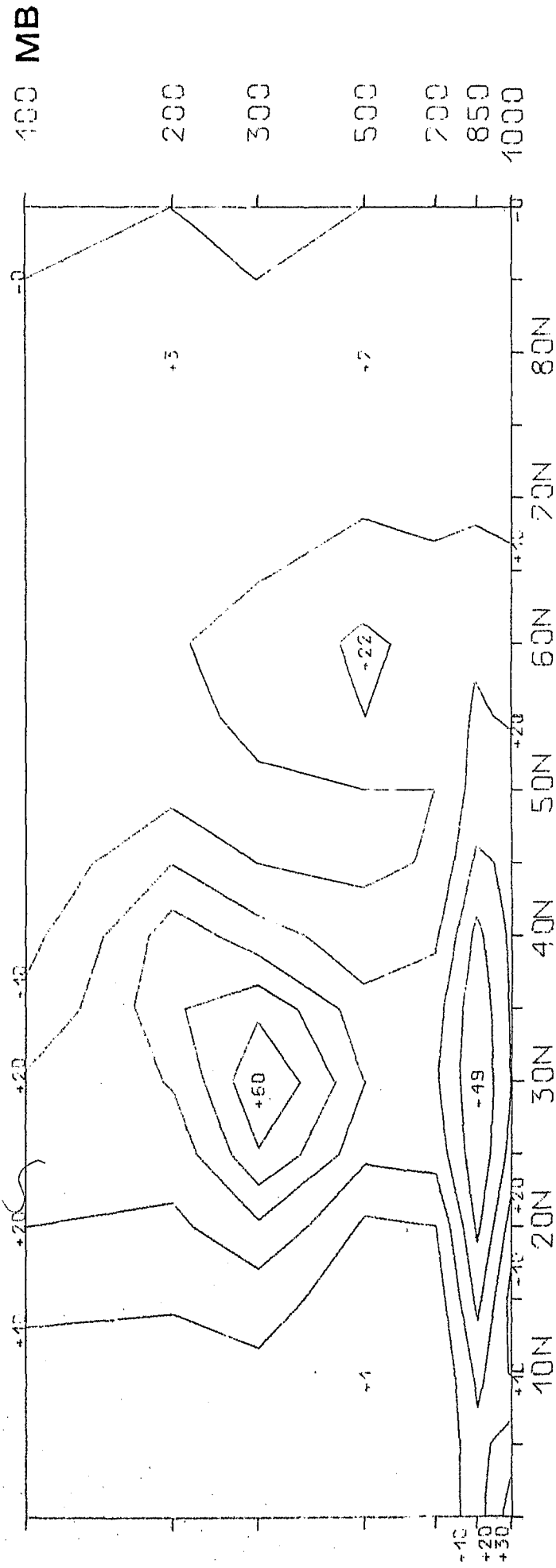


$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 67



A MSE. 1 - 15 $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 68

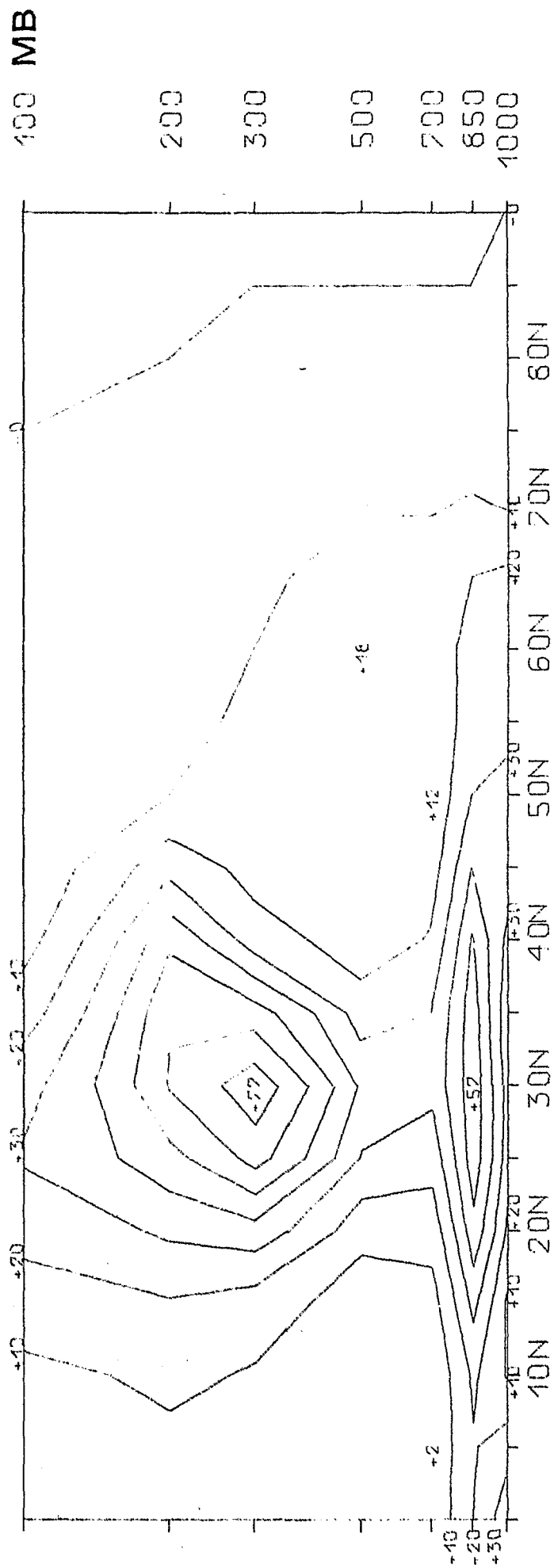
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$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 69

$A_{\text{MSE. 1-15}}$

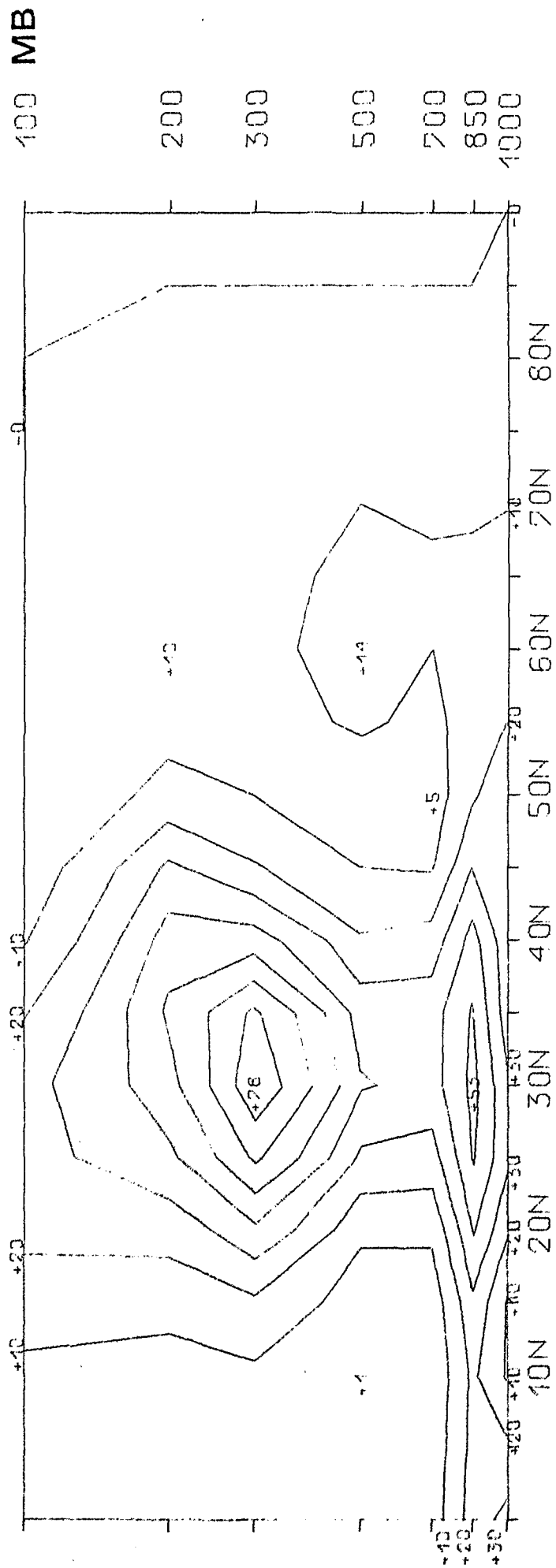
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$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 70

$A_{\text{MSE}, 1-15}$

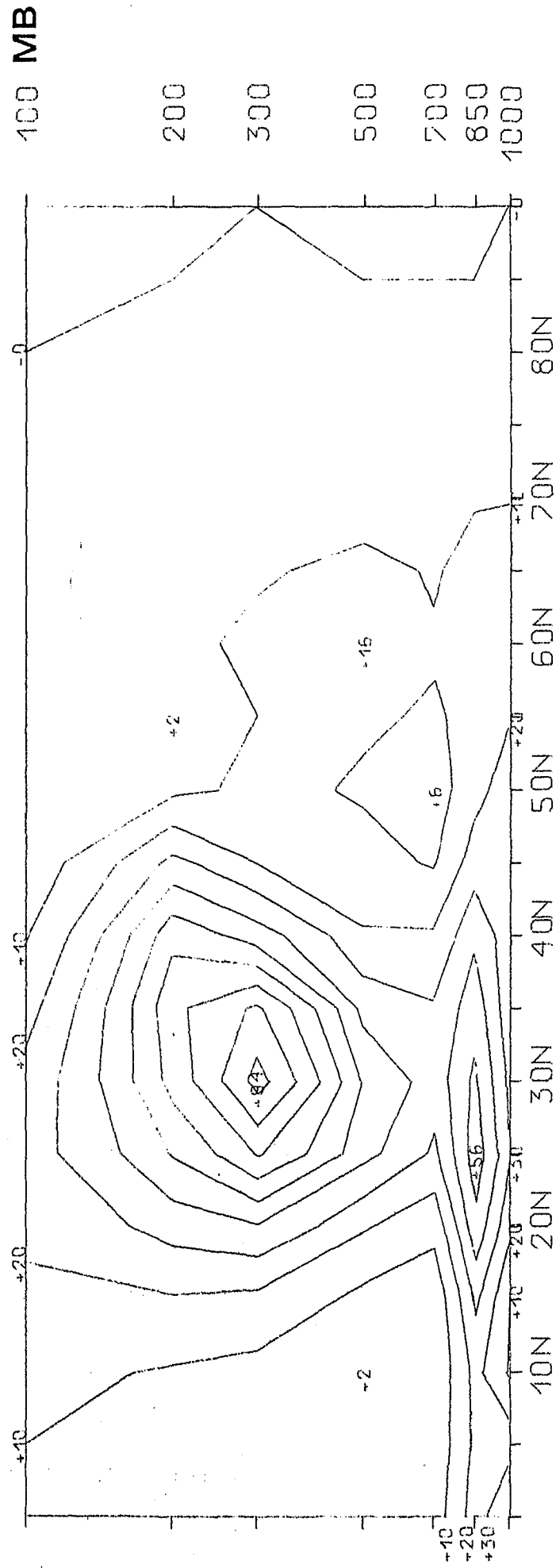
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11

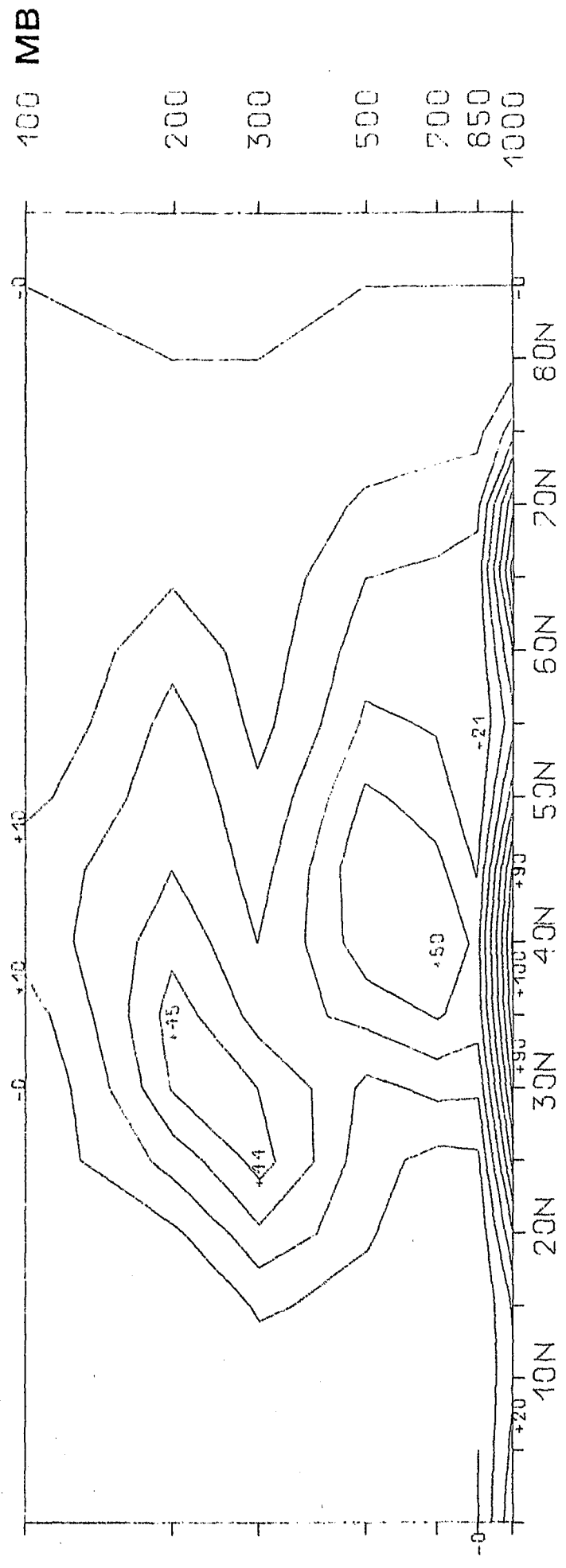
$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JUL 71

KENNZIFFER 36077200



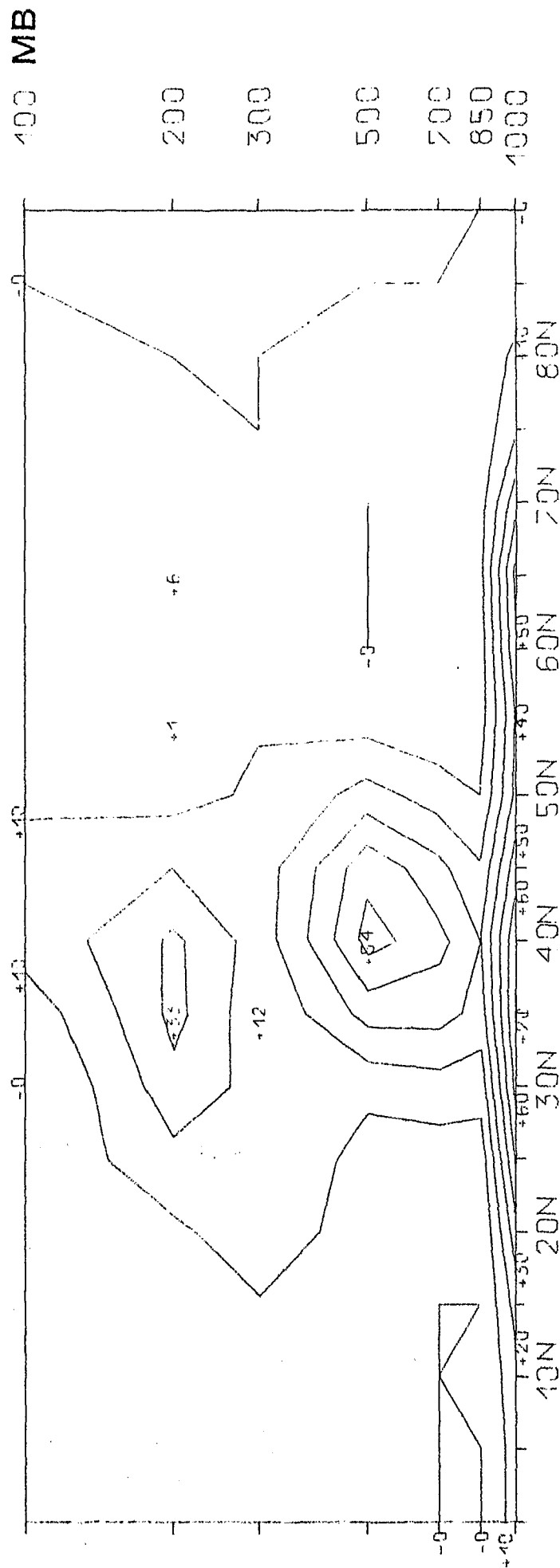
$A_{MSE, 1-15} \cdot 10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 72

KENNZIFFER. 36046700



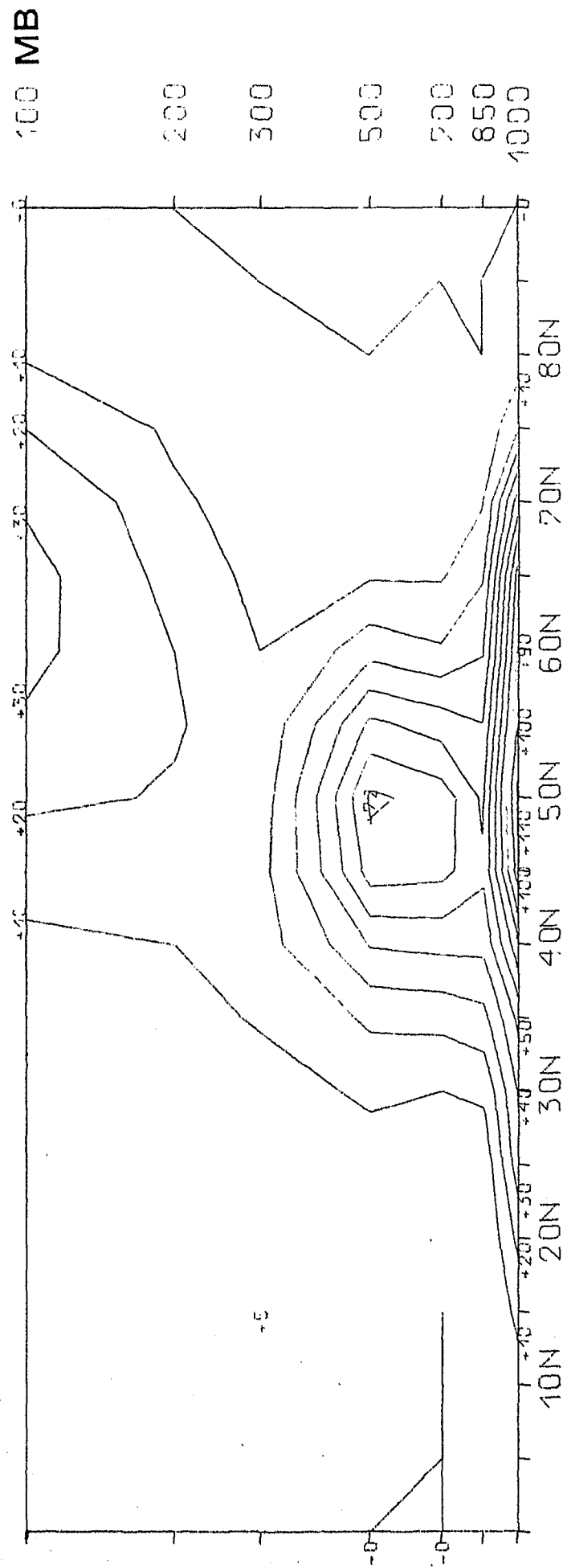
$A_{MSE: 1}$ $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN. 67

PENNZIPFER. 38016800



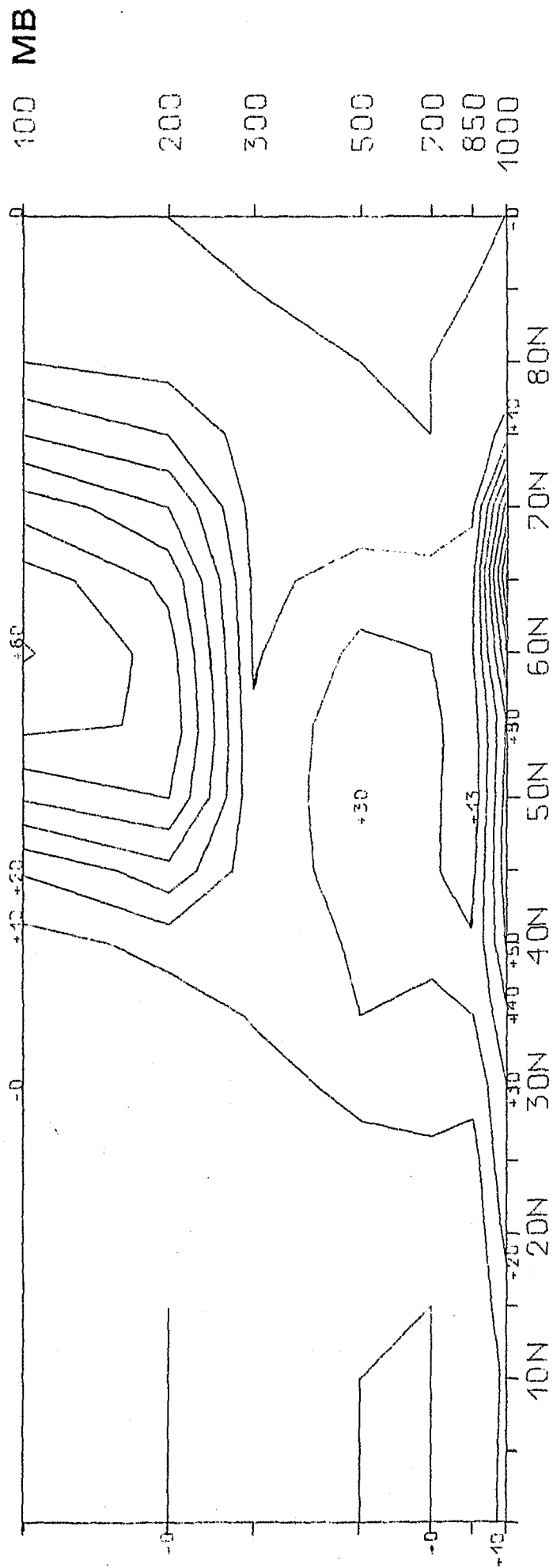
$A_{MSE, 1}$ $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.68

KENNZIFFER. 36016900



$A_{MSE, 1}$ $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.69

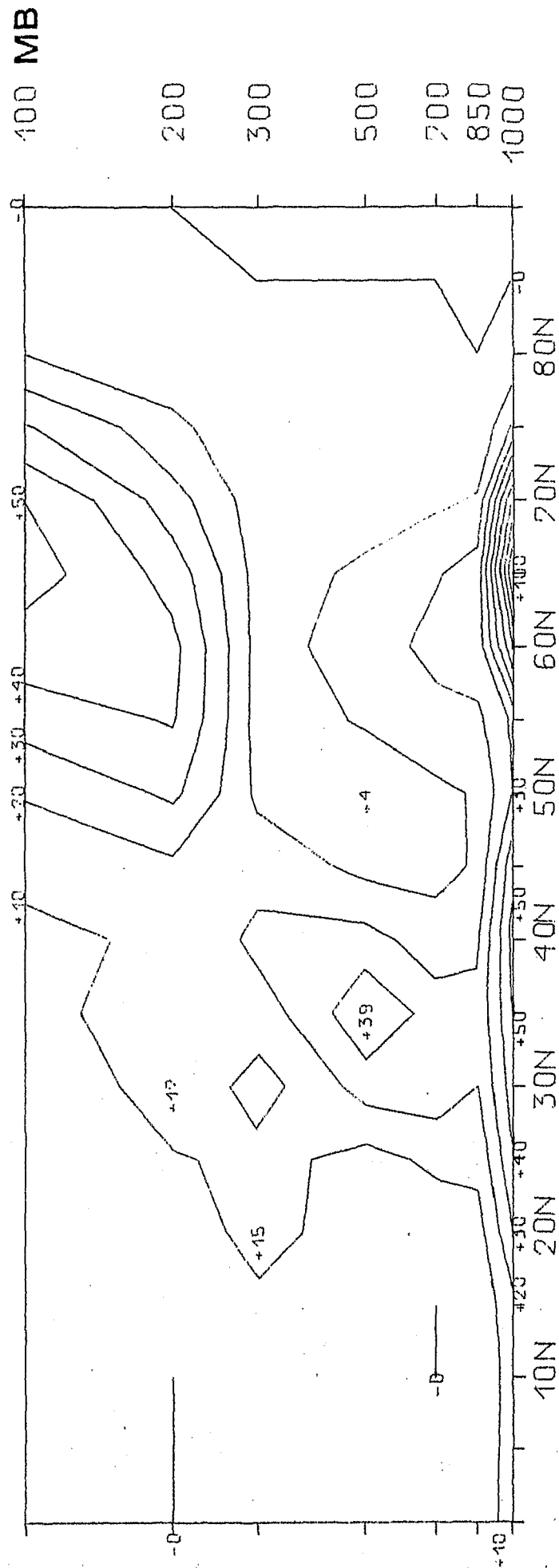
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$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.70

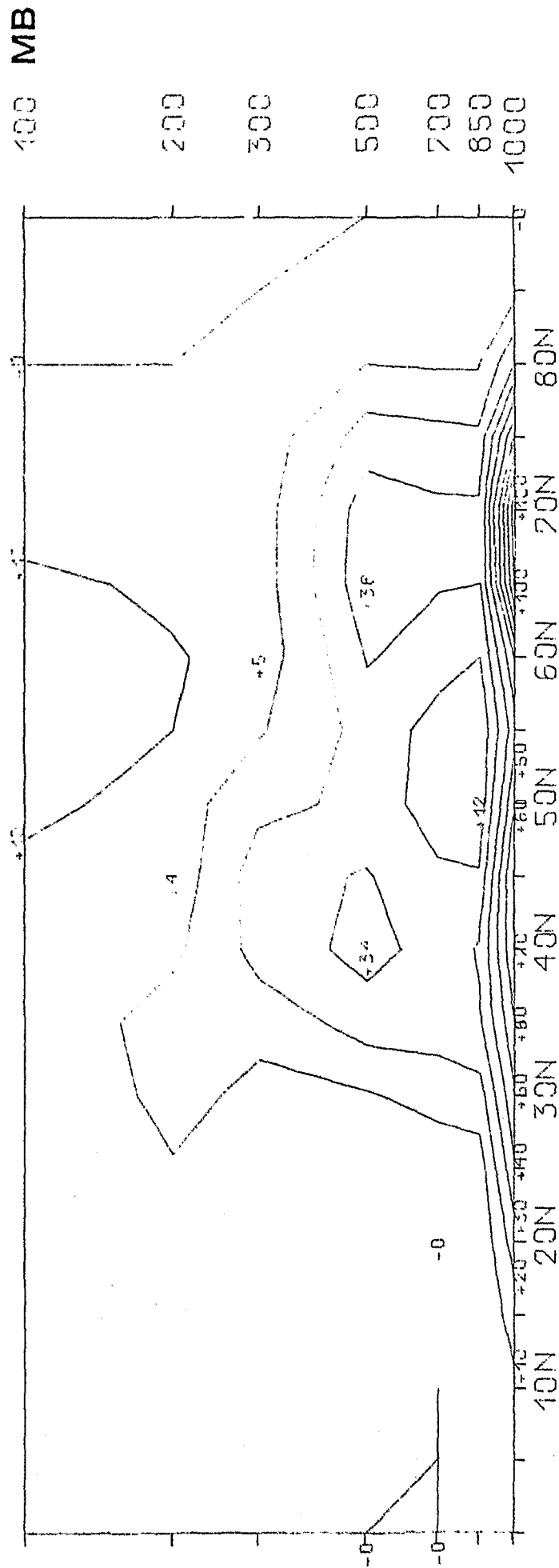
A_{MSE, 1}

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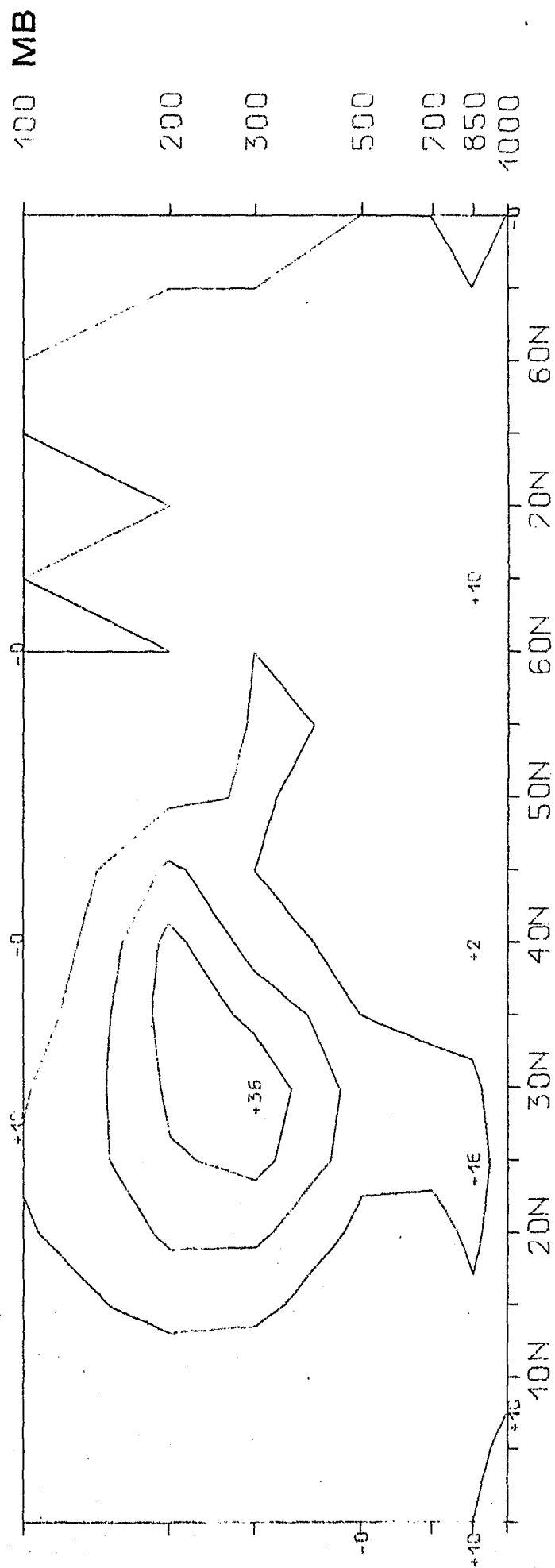
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KEINZIFFER 36017205



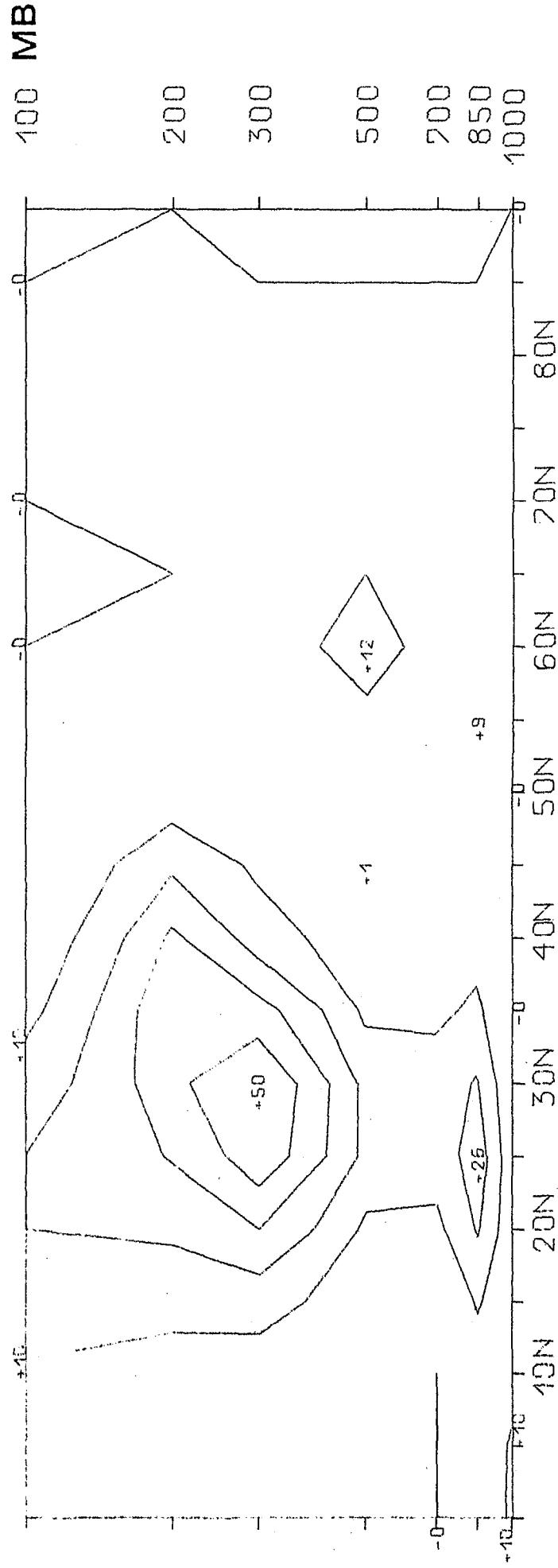
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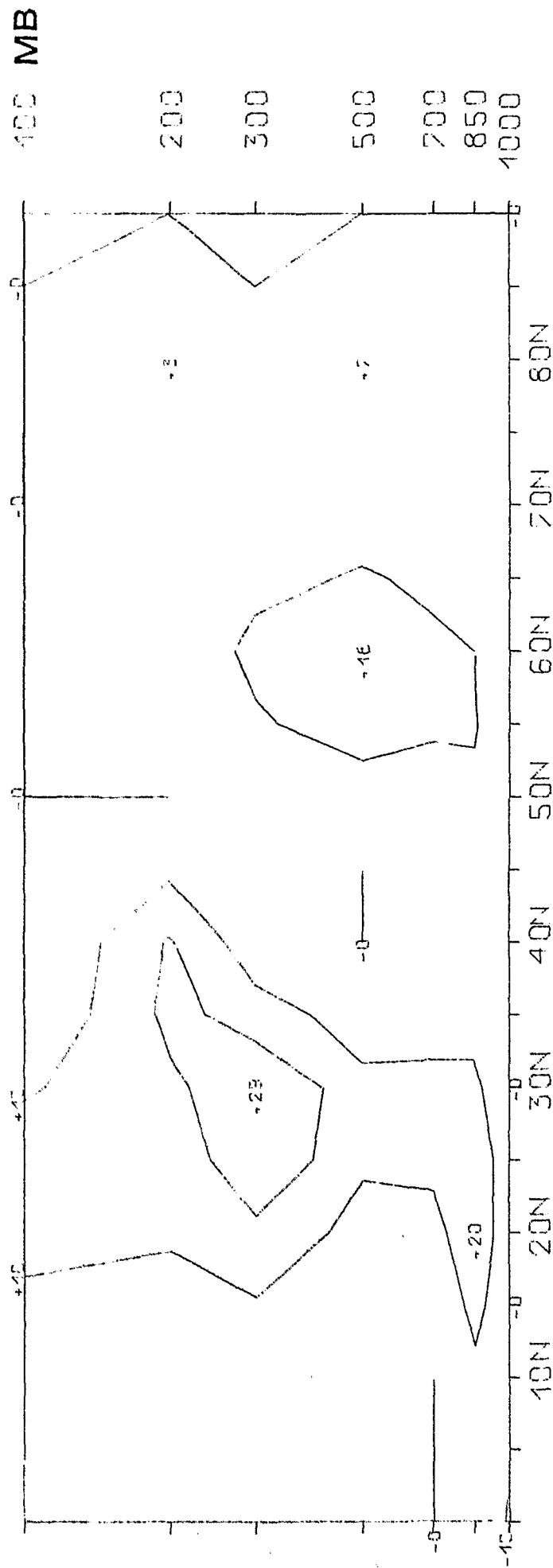
$P_{MSE, 1}$ $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 67

KENNZIFFER. 38076800



$A_{MSE, 1}$ $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 68

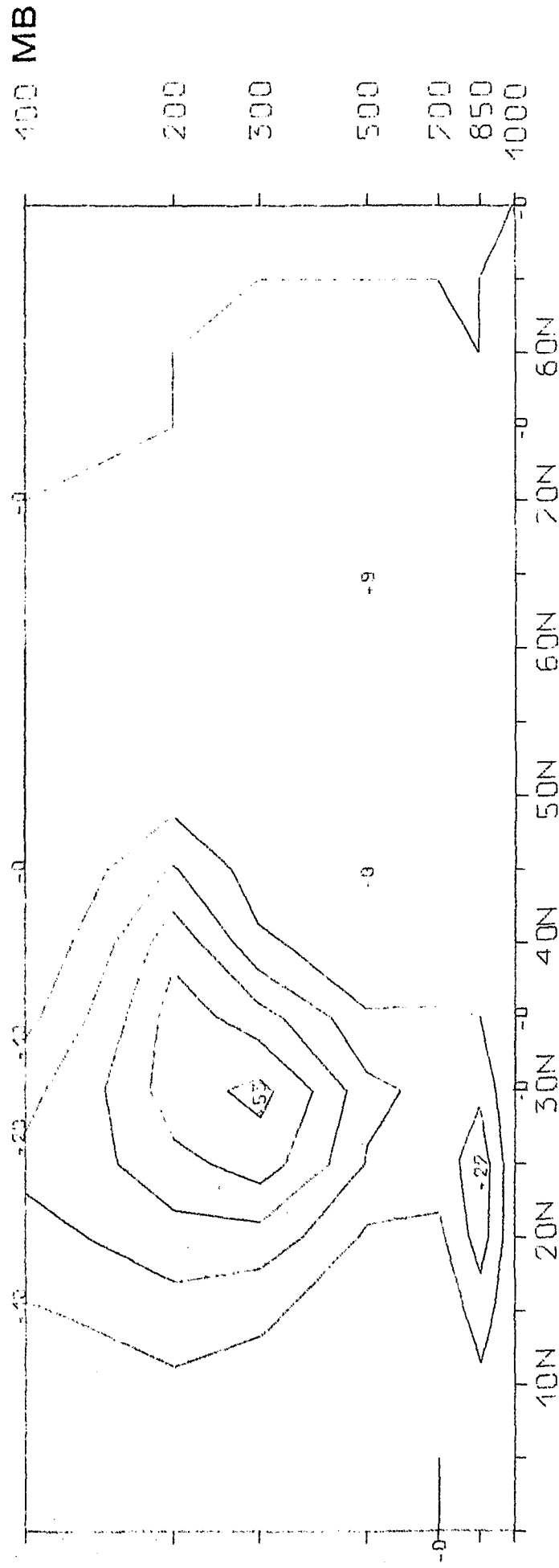
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$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 69

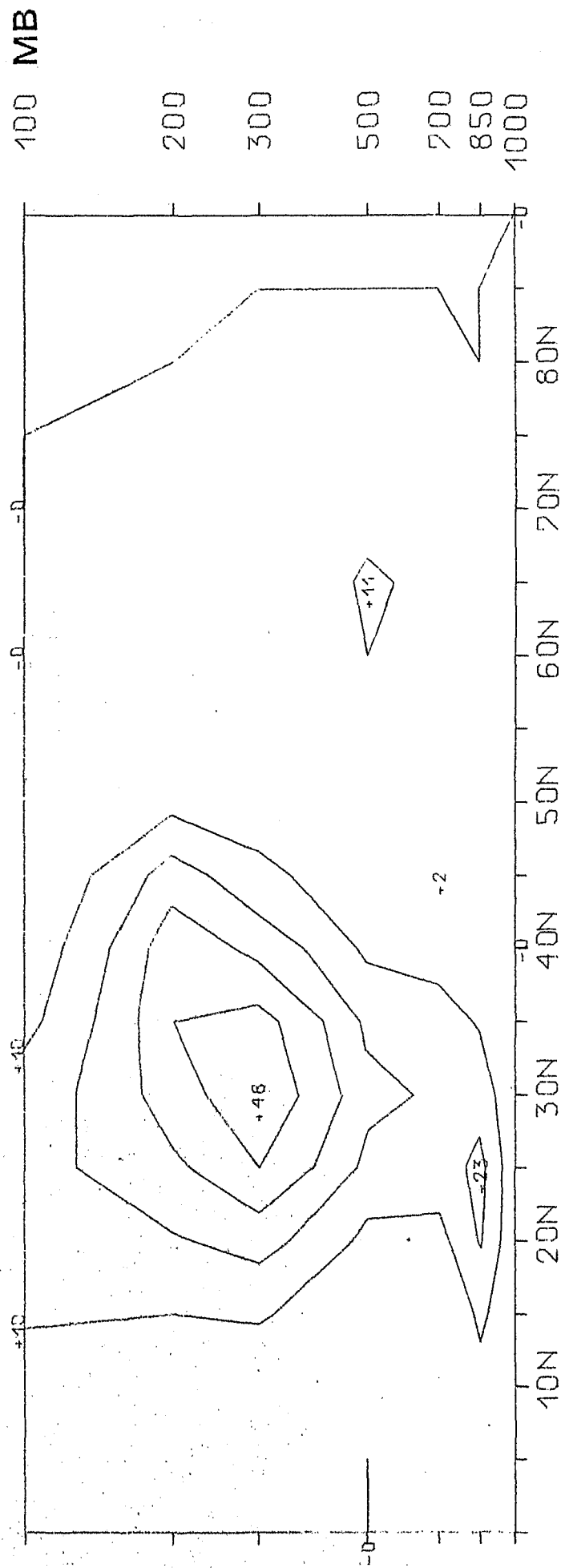
$A_{\text{net}, 1}$

KENNEDY 38077000



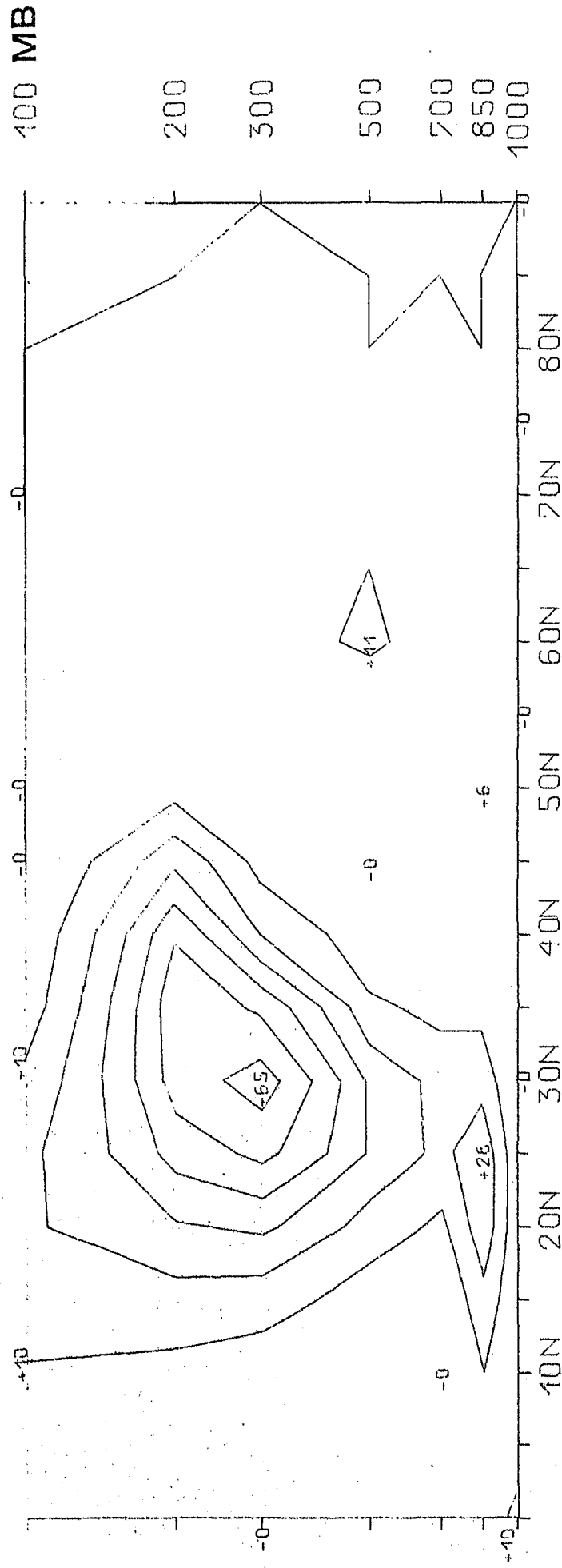
$\bar{P}_{MSE, 4}$ $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 70

KENNZIFFER: 36077100



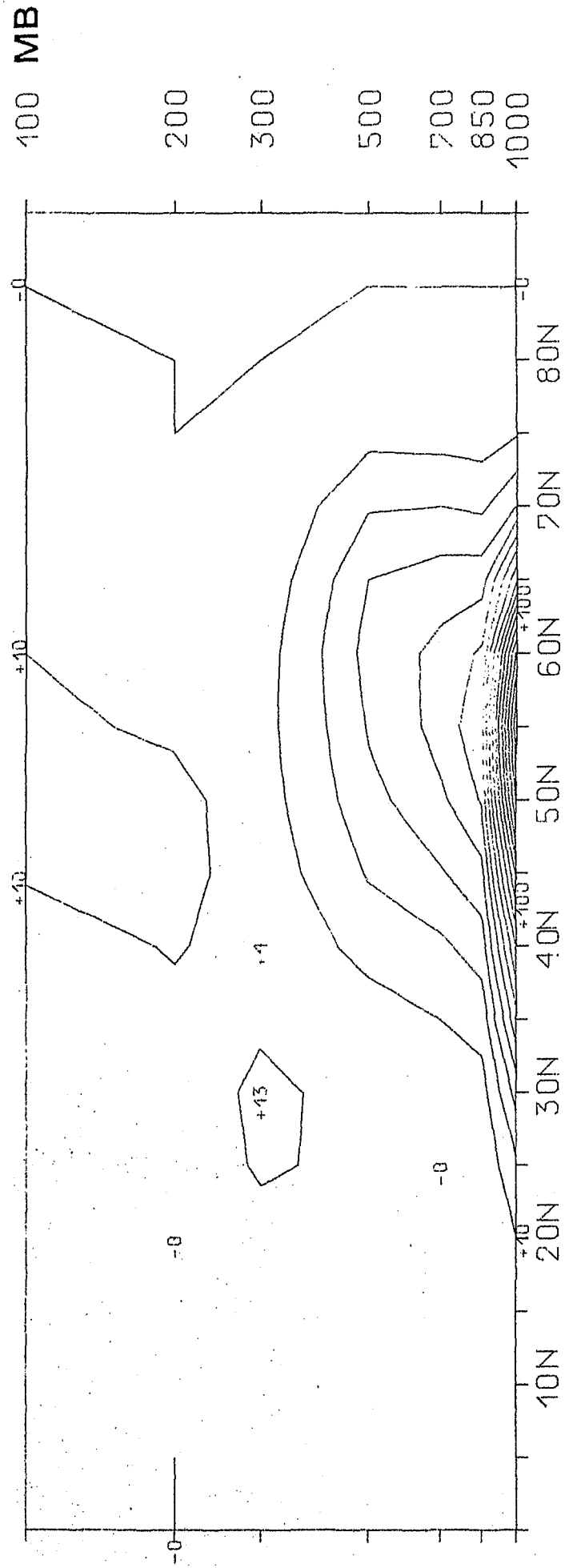
$P_{MSE, 1}$ $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 71

KENNZIFFER: 38077200



$A_{MSF, 1}$ $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 72

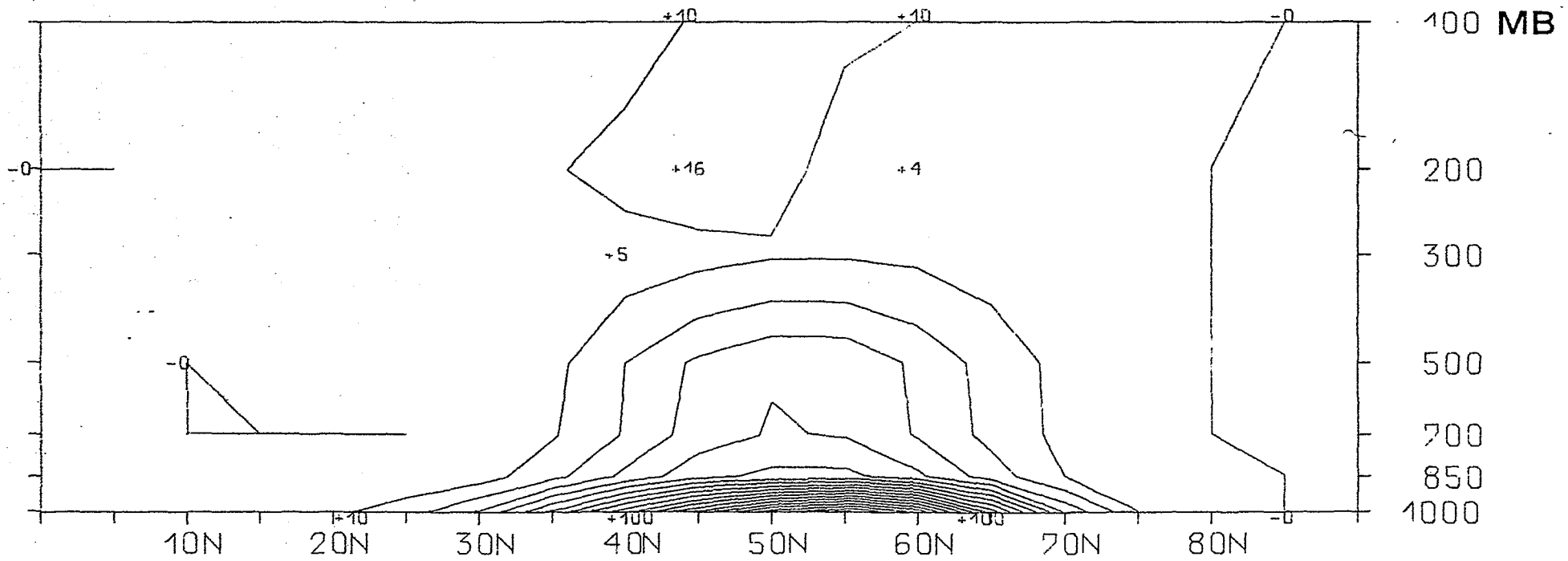
KENNZIFFER: 42016700



$A_{MSE, 2-3}$ $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN. 67

KENNZIFFER:

42016800



A

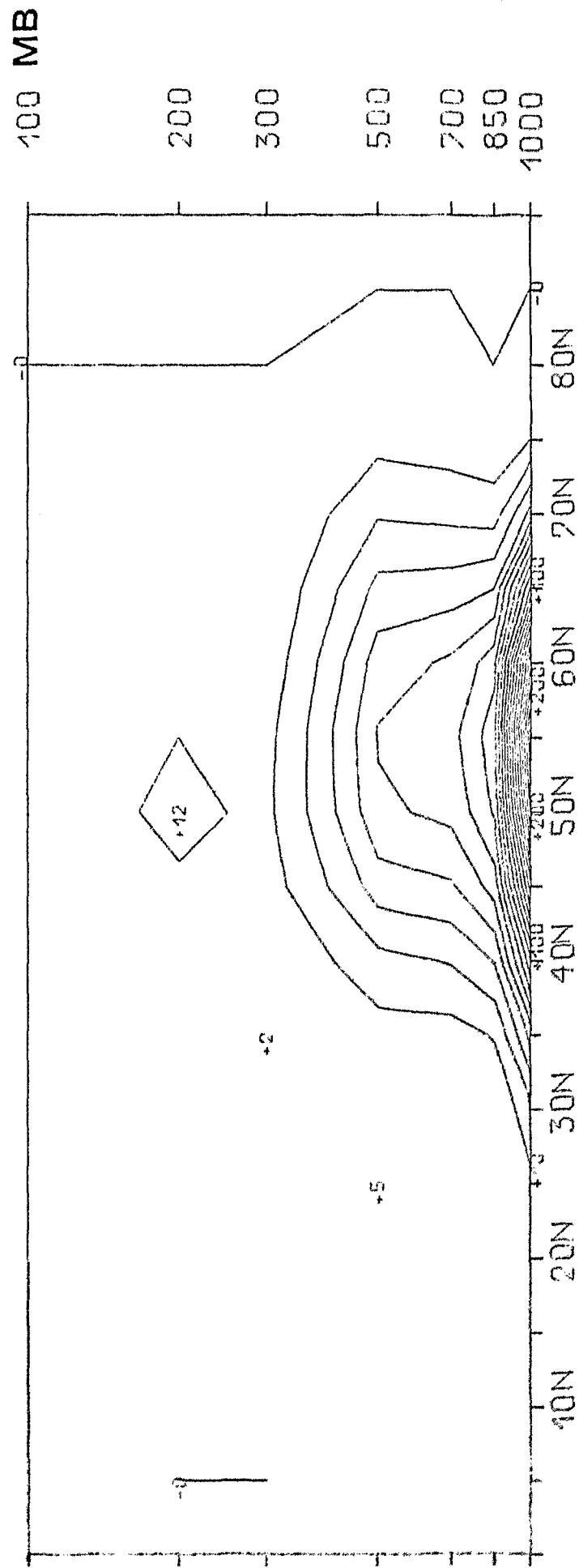
MSE, 2 - 3

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.68

Abb.38

KENNZIFFER.

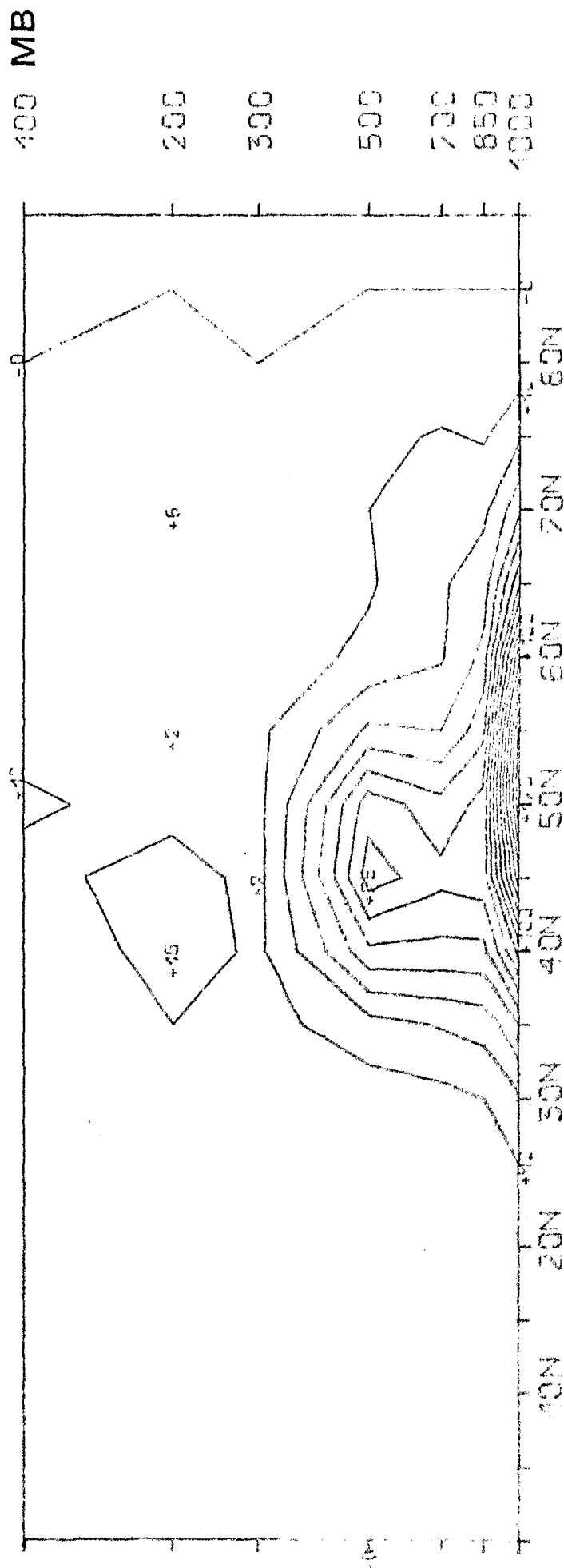
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P_{ref} 2 - 3

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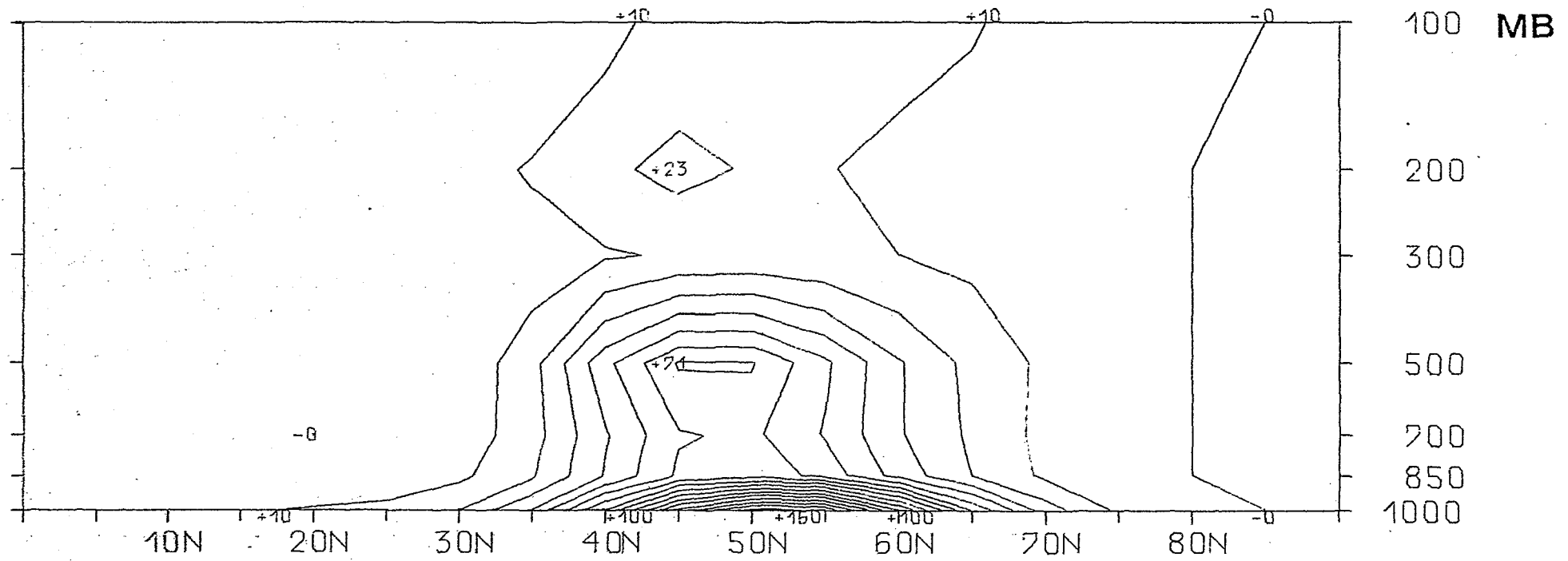
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$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.70

KENNZIFFER:

42017100



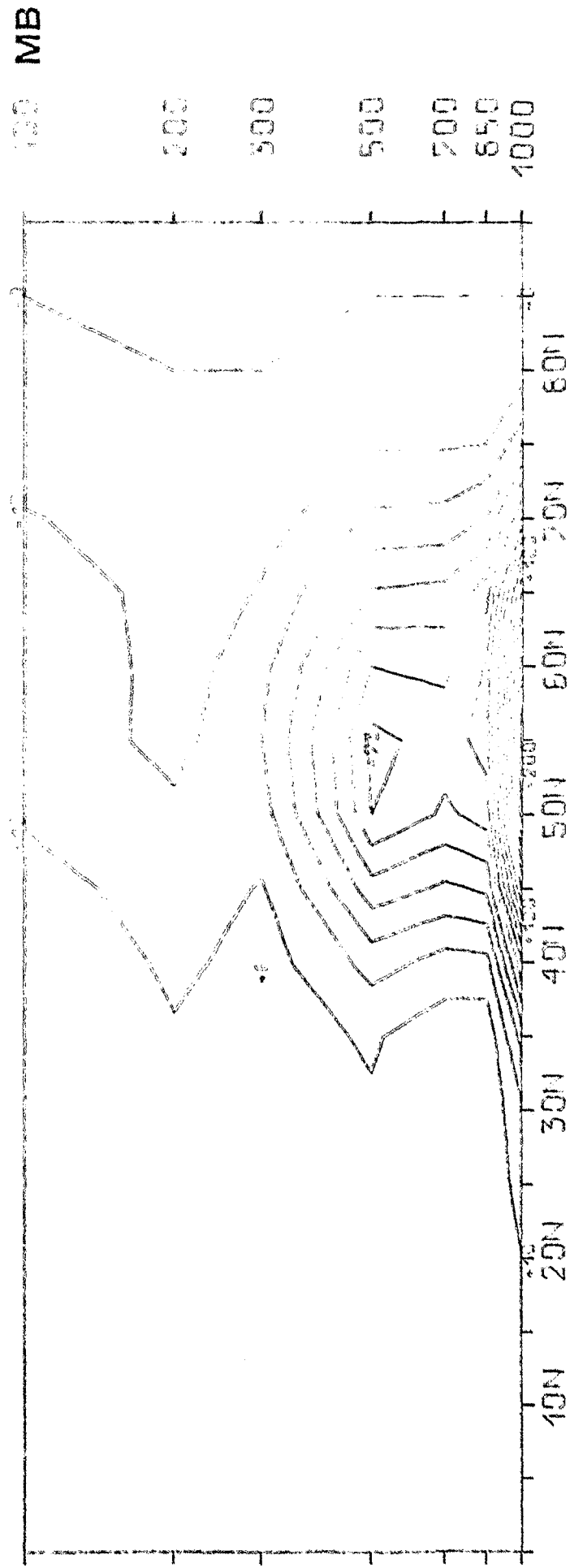
A

MSE, 2 - 3

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.71

Abb.41

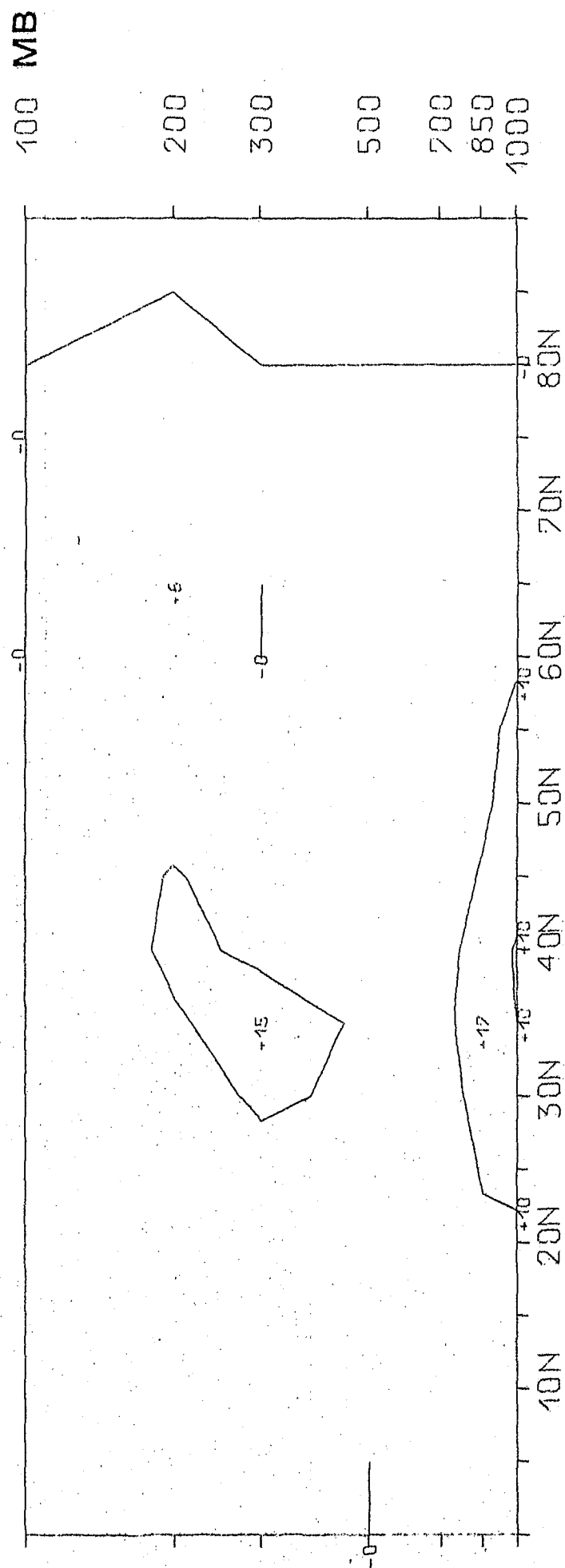
Figure 155



$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.72

$A_{\text{MSE}, 2} - 3$

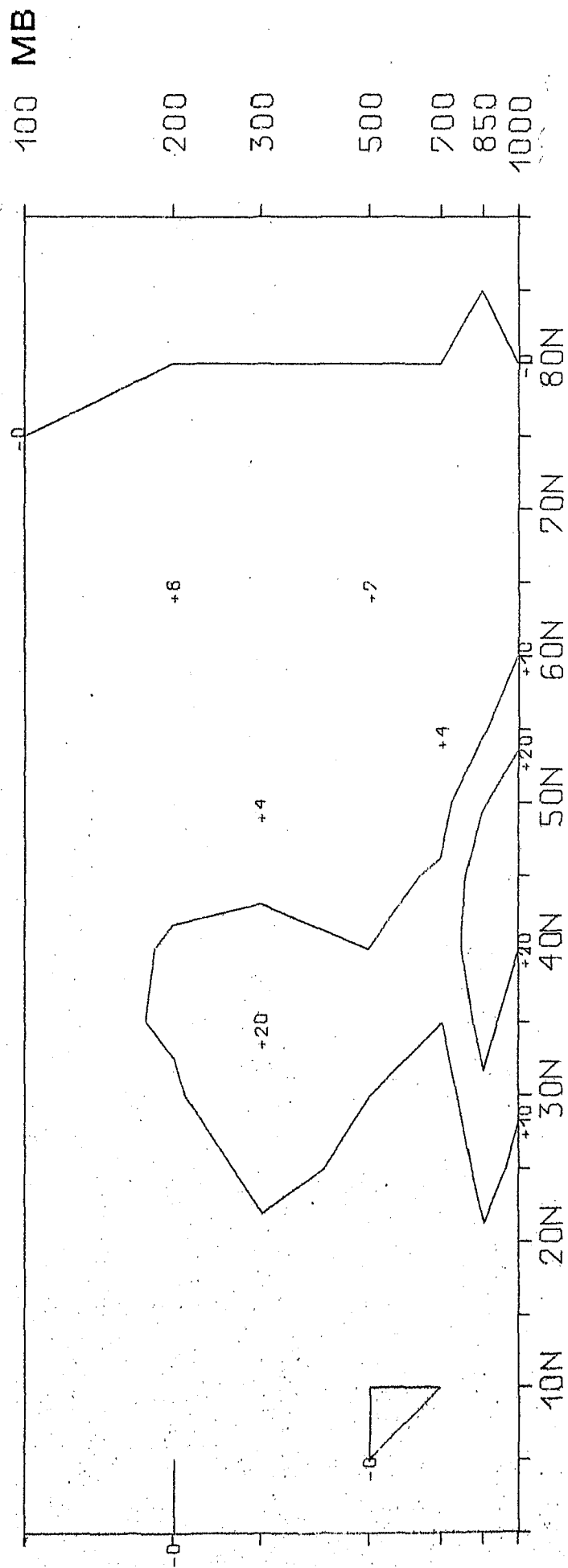
KENNZIFFER: 42076700



$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 67

A MSE: 2 - 3

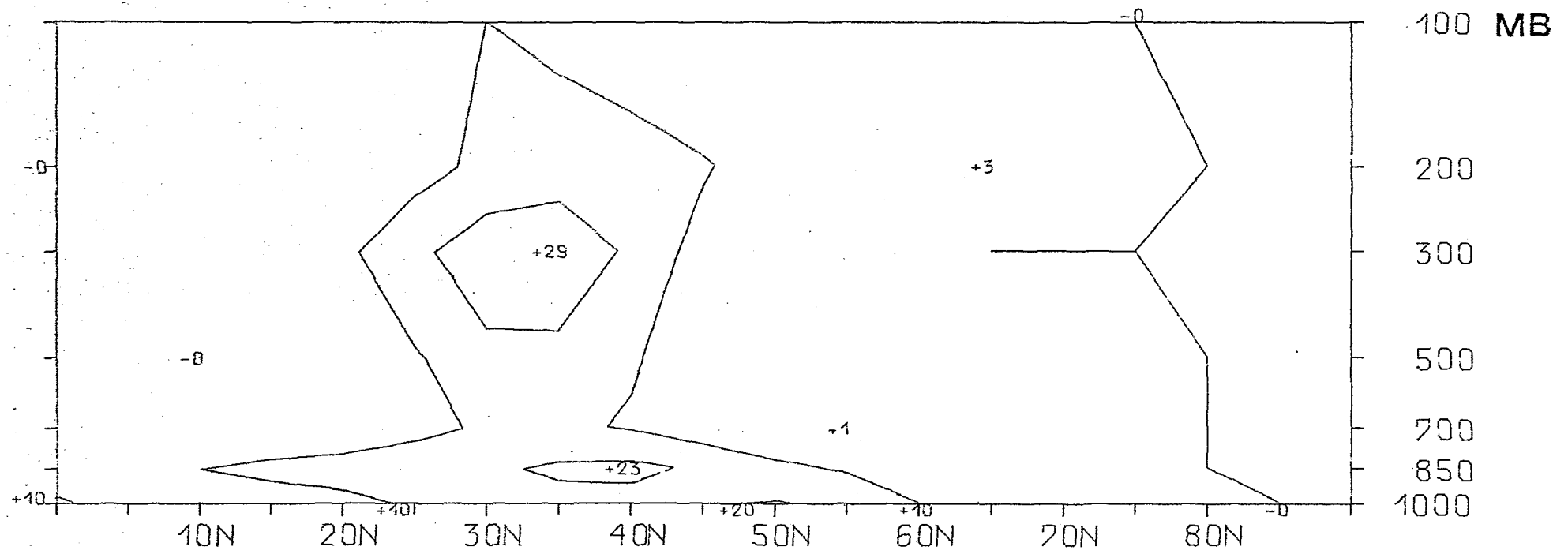
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$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 68

A_{MSE, 2 - 3}

KENNZIFFER: 42076900

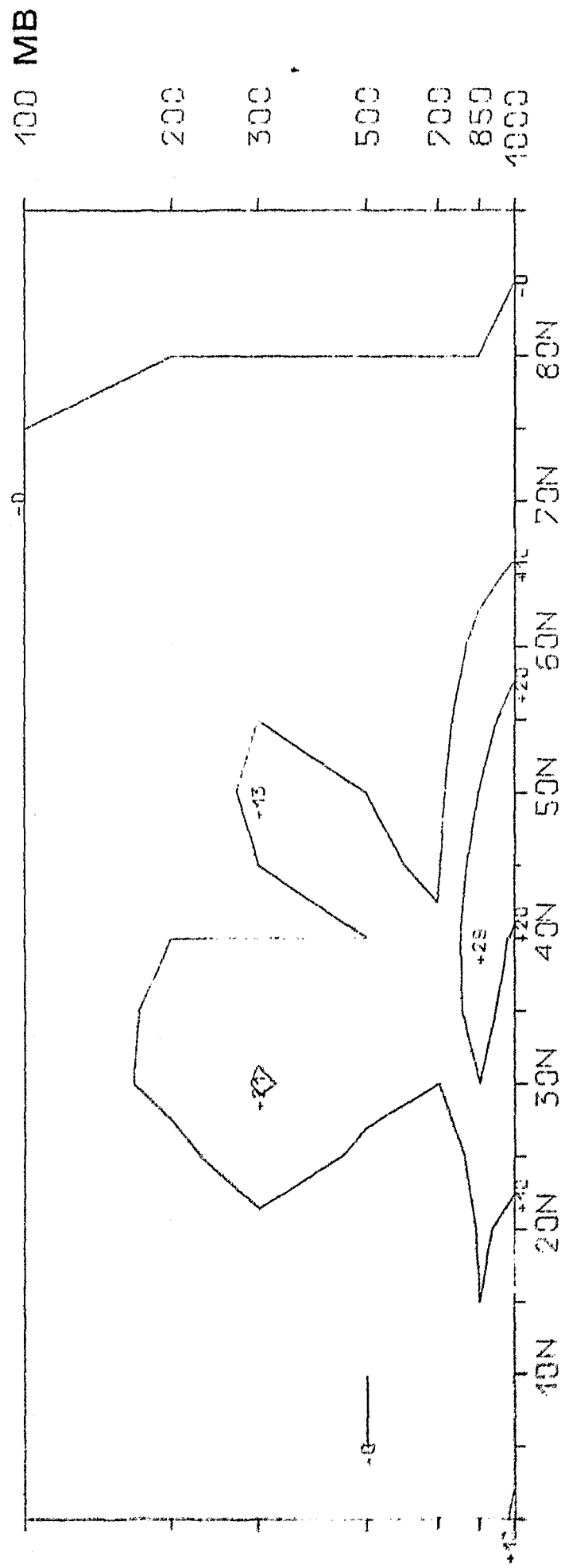


A

MSF, 2 - 3

10^{-3} J CM⁻² MB⁻¹ JULI 69

KENNZIFFER: 42077000

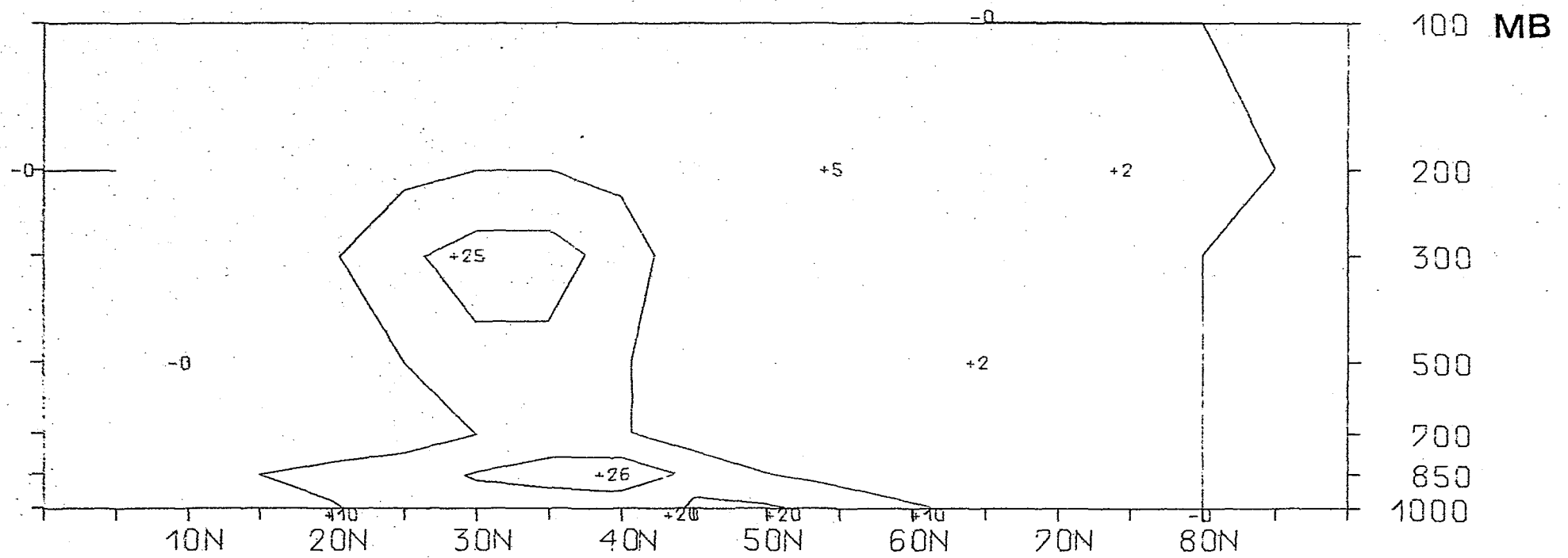


$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 70

$\bar{P}_{\text{NET}} \cdot 2 - 3$

KENNZIFFER:

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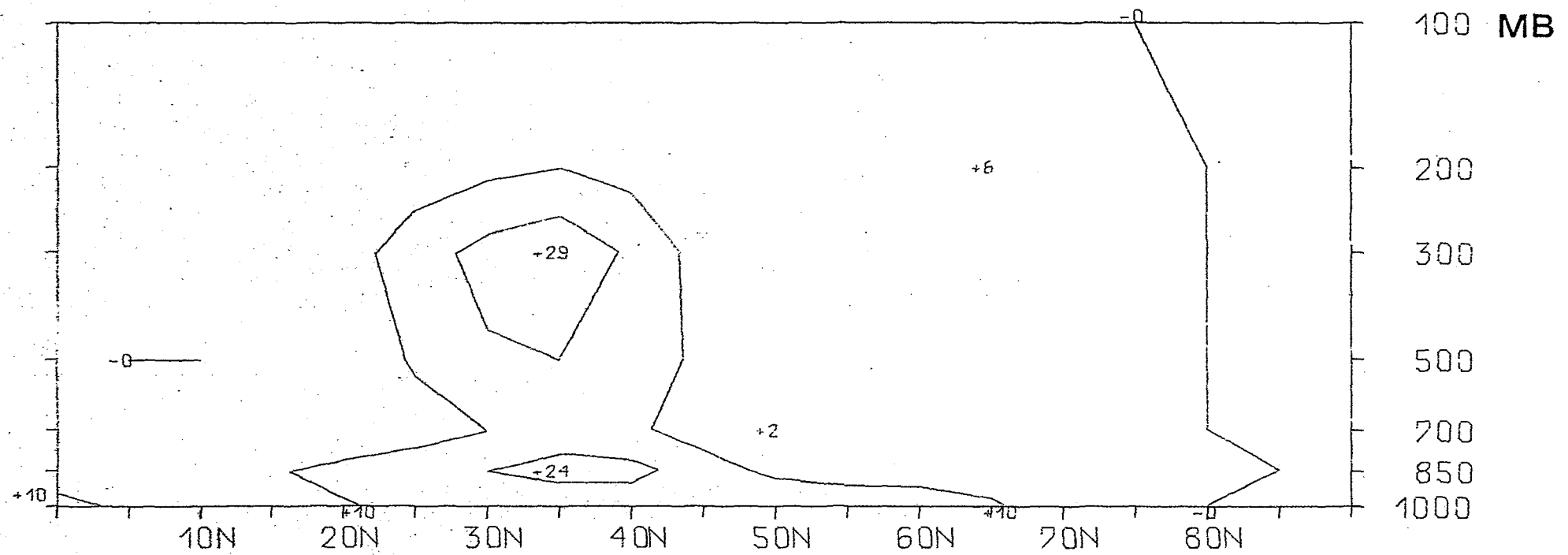


A

MSE, 2 - 3

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 71

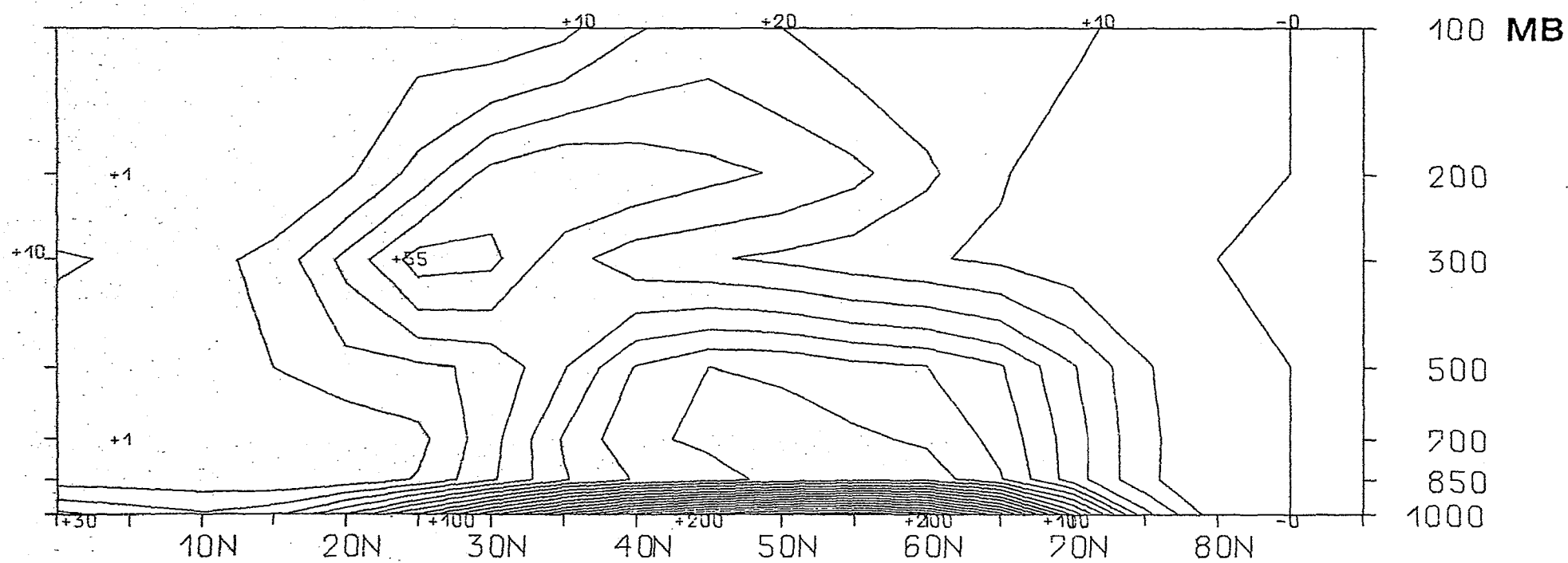
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A
MSE: 2 - 3

10^{-3} J CM⁻² MB⁻¹ JULI 72

KENNZIFFER: 43016700

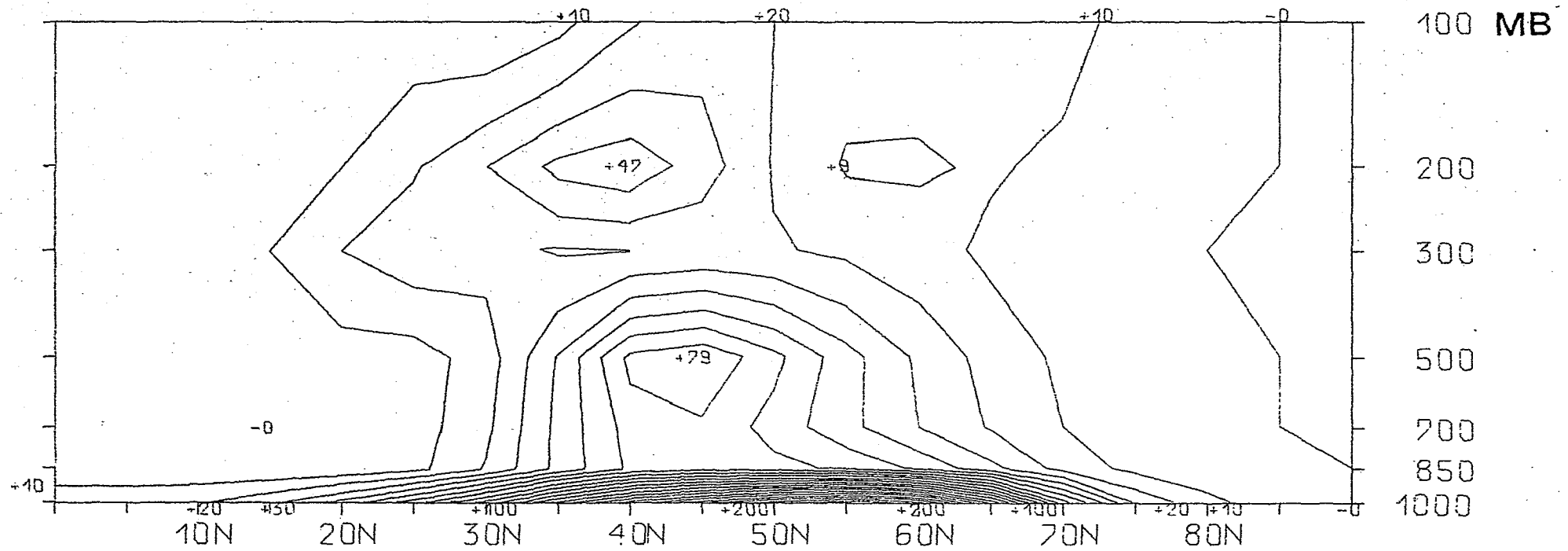


A
MSE, 1 - 3

10^{-3} J CM⁻² MB⁻¹ JAN. 67

KENNZIFFER:

43016800



A

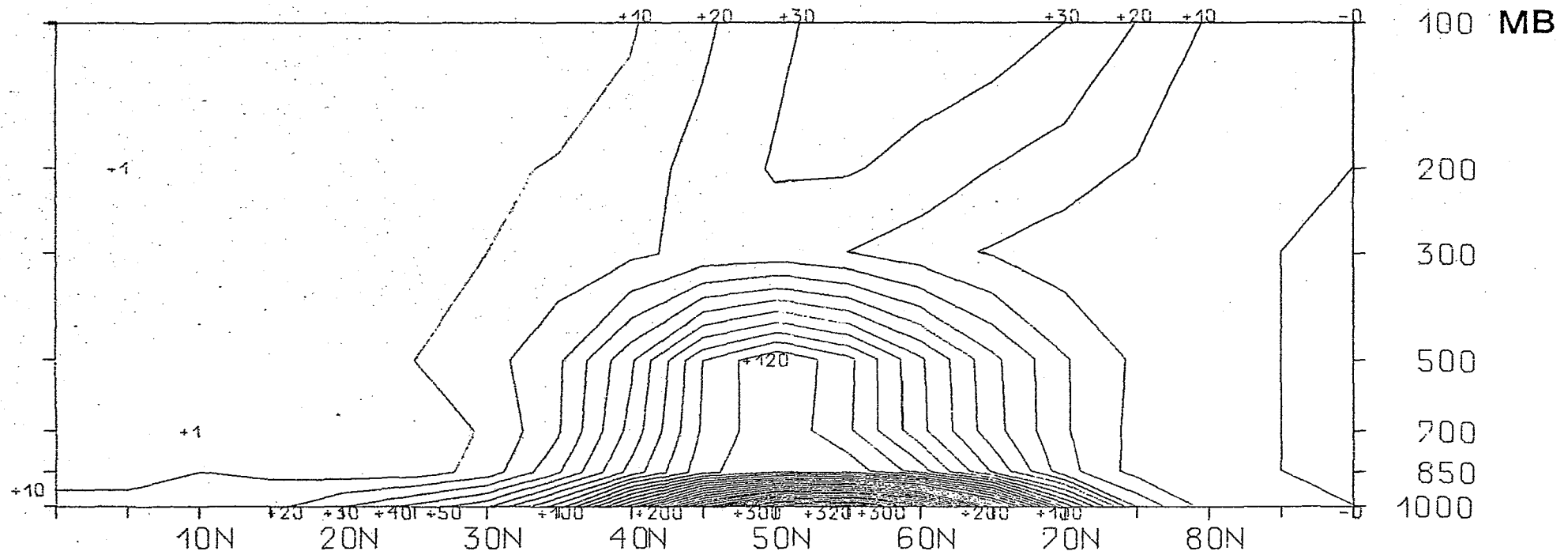
MSE, 1 - 3

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.68

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KENNZIFFER:

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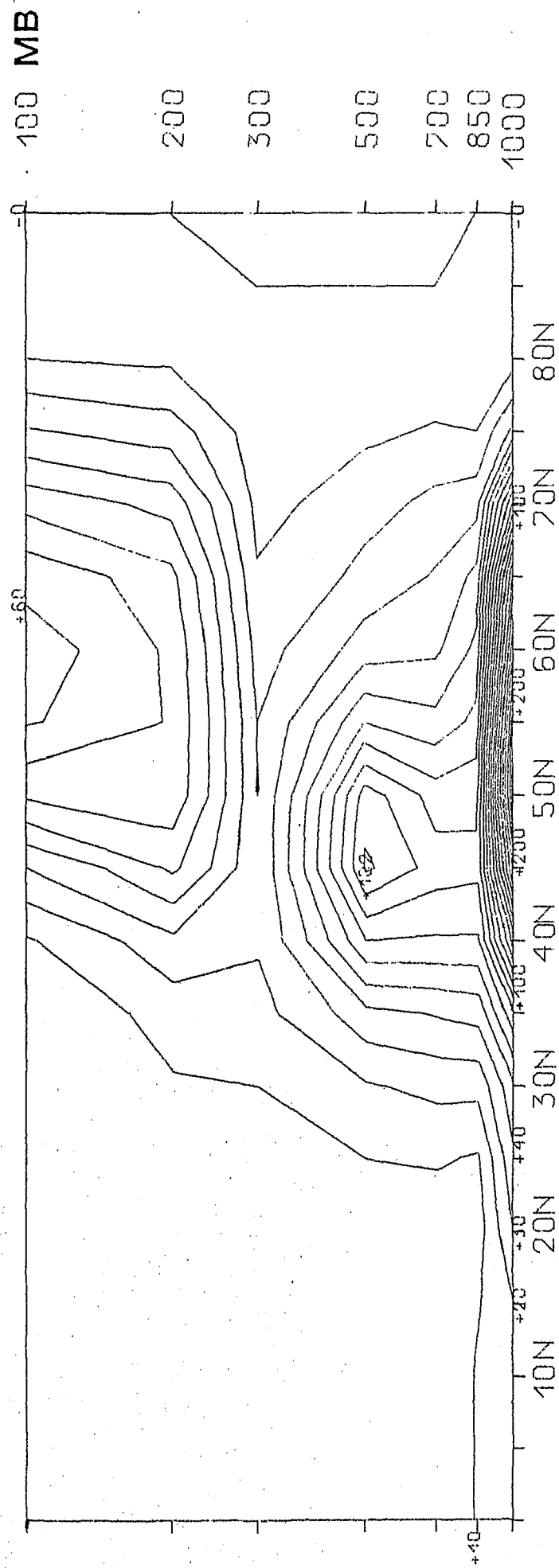
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MSE, 1 - 3

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.69

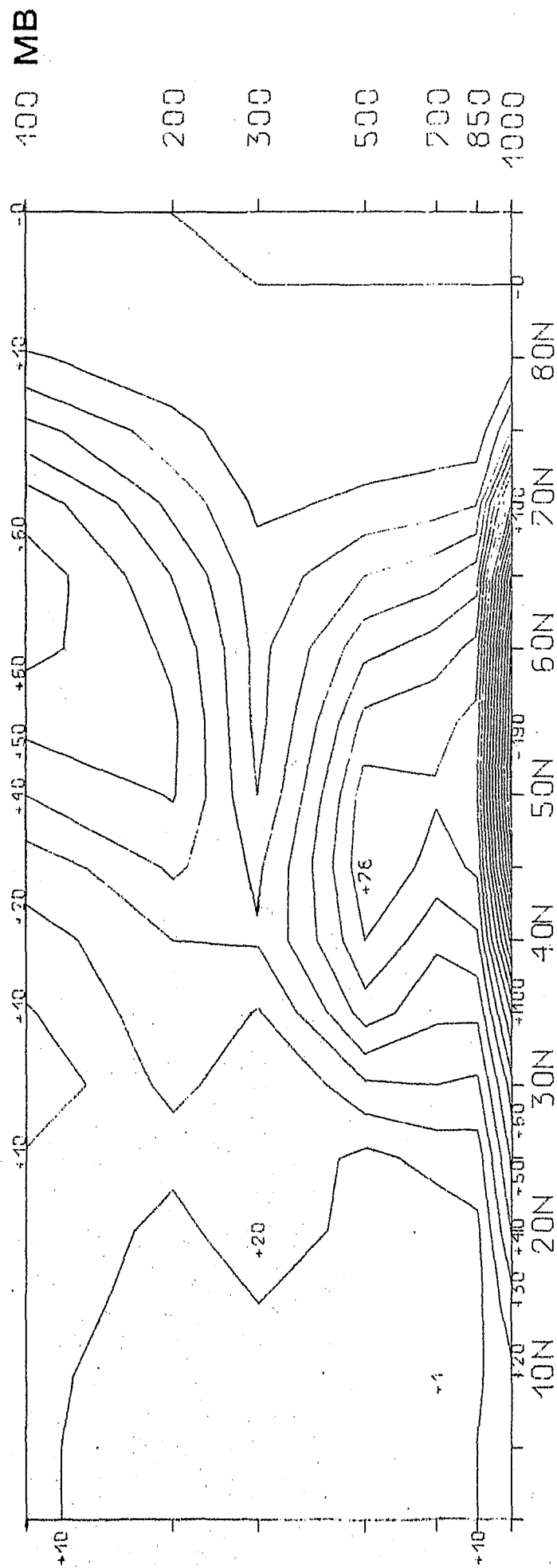
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KENNZIFFER: 43017000



$A_{MSE, 1-3}$ $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.70

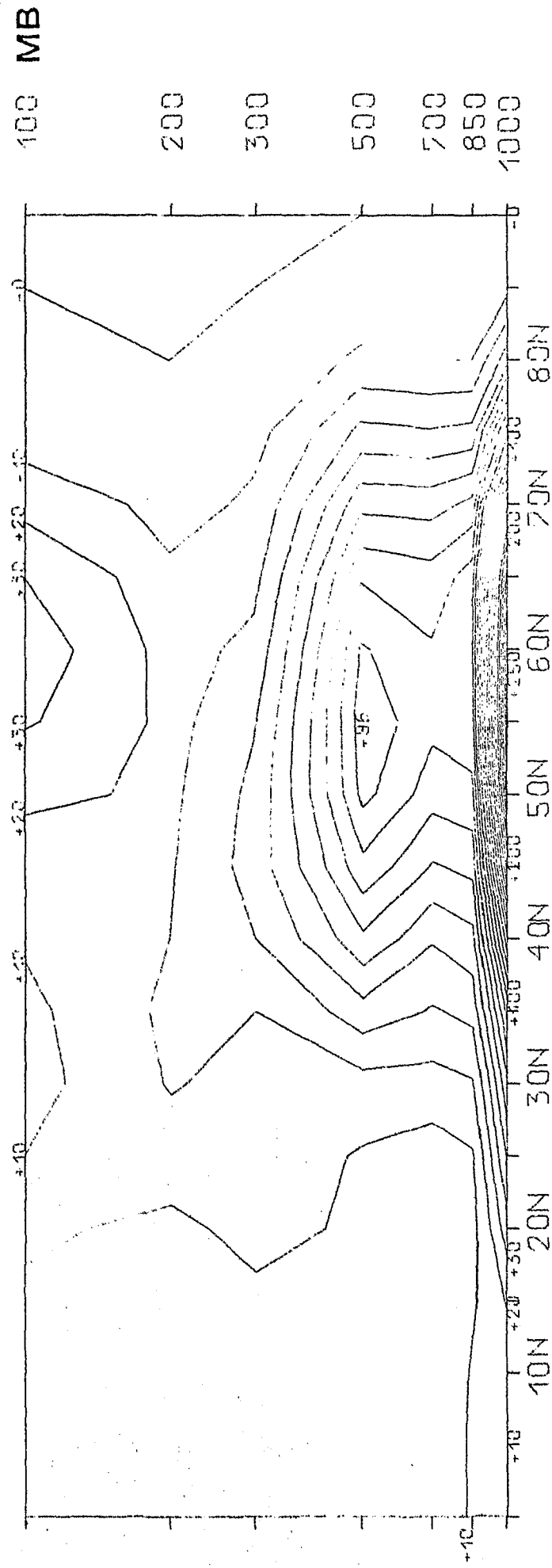
KENNZIFFER 43017100



$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.71

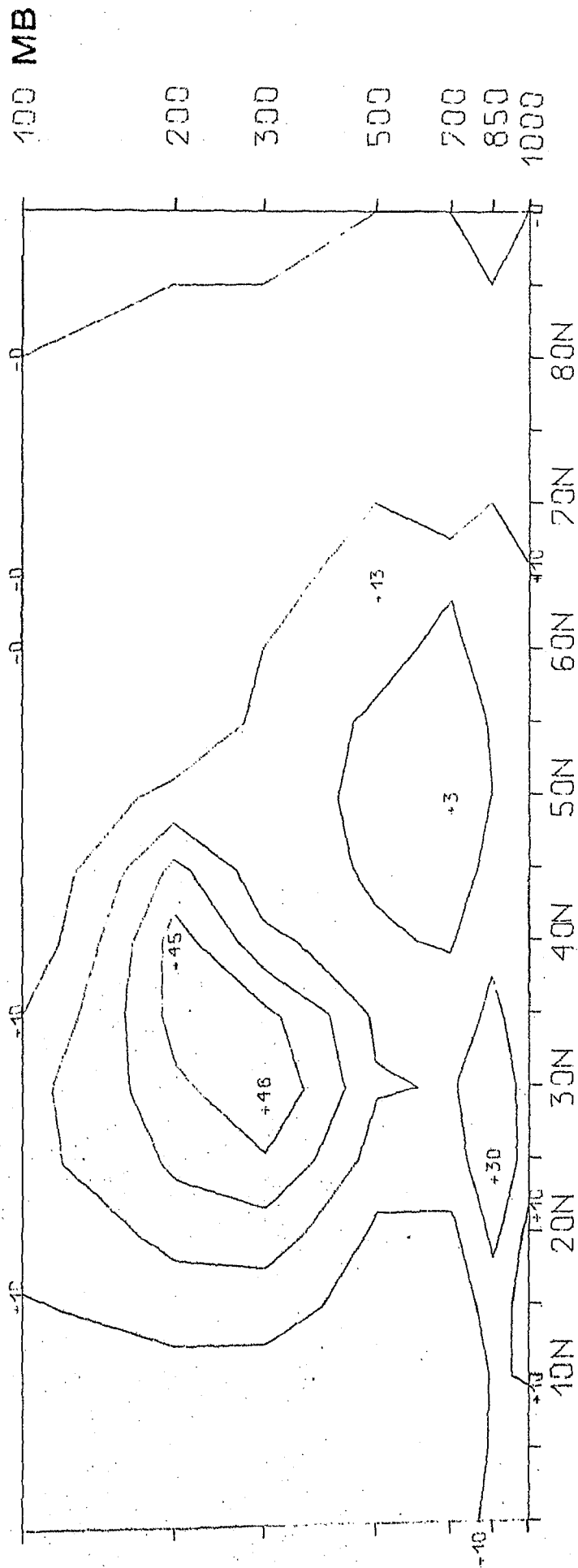
$\bar{A}_{\text{MSE}}: 1 - 3$

KENNZIFFER 43017200



$A_{MSE, 1 - 3} \cdot 10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1} \text{ JAN.72}$

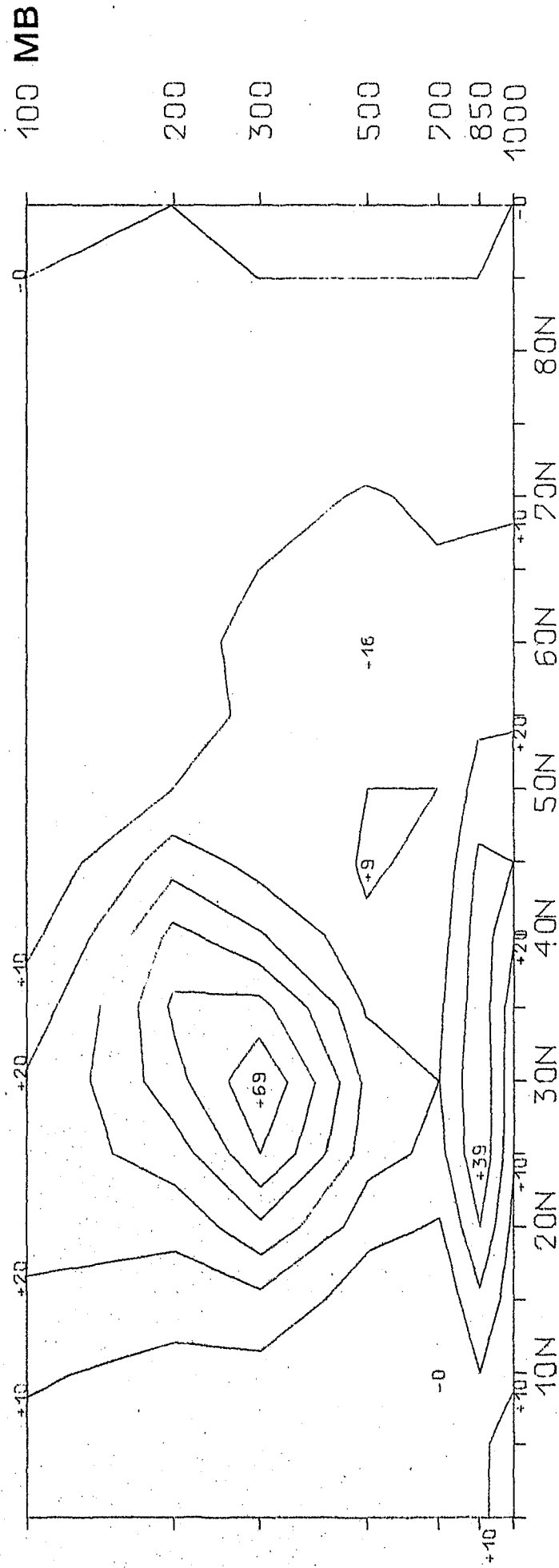
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$A_{MSE, 1-3}$ $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 67

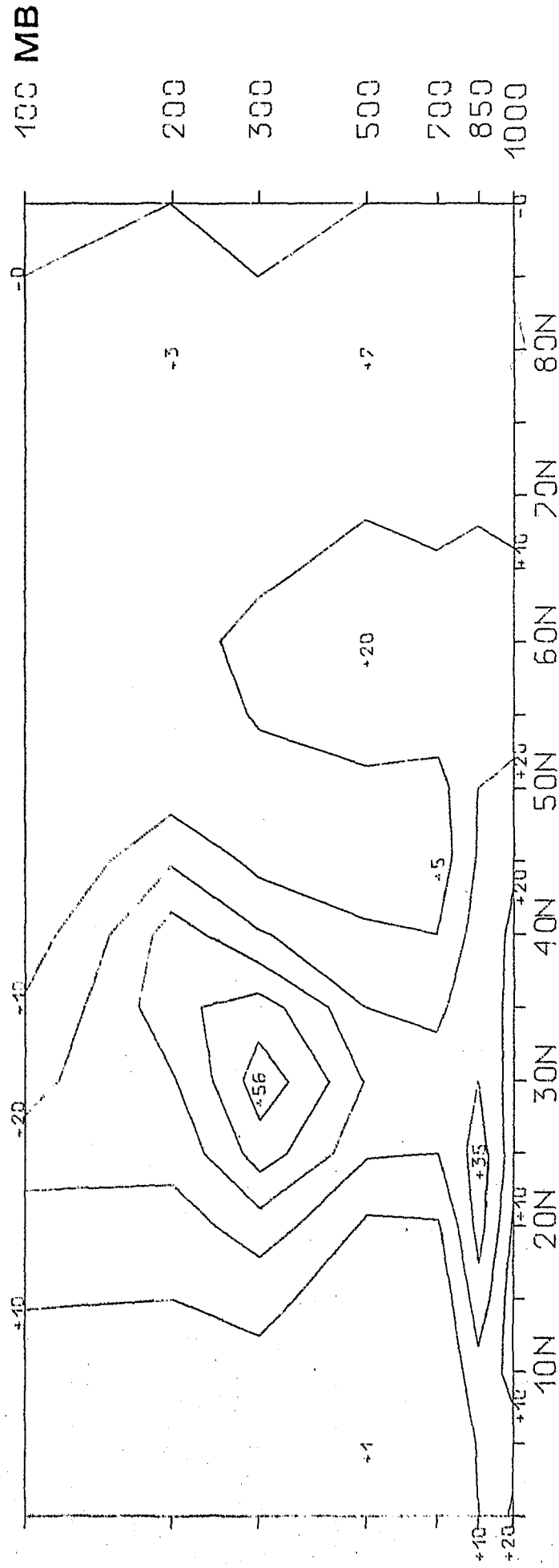
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KENNZIFFER: 43076800



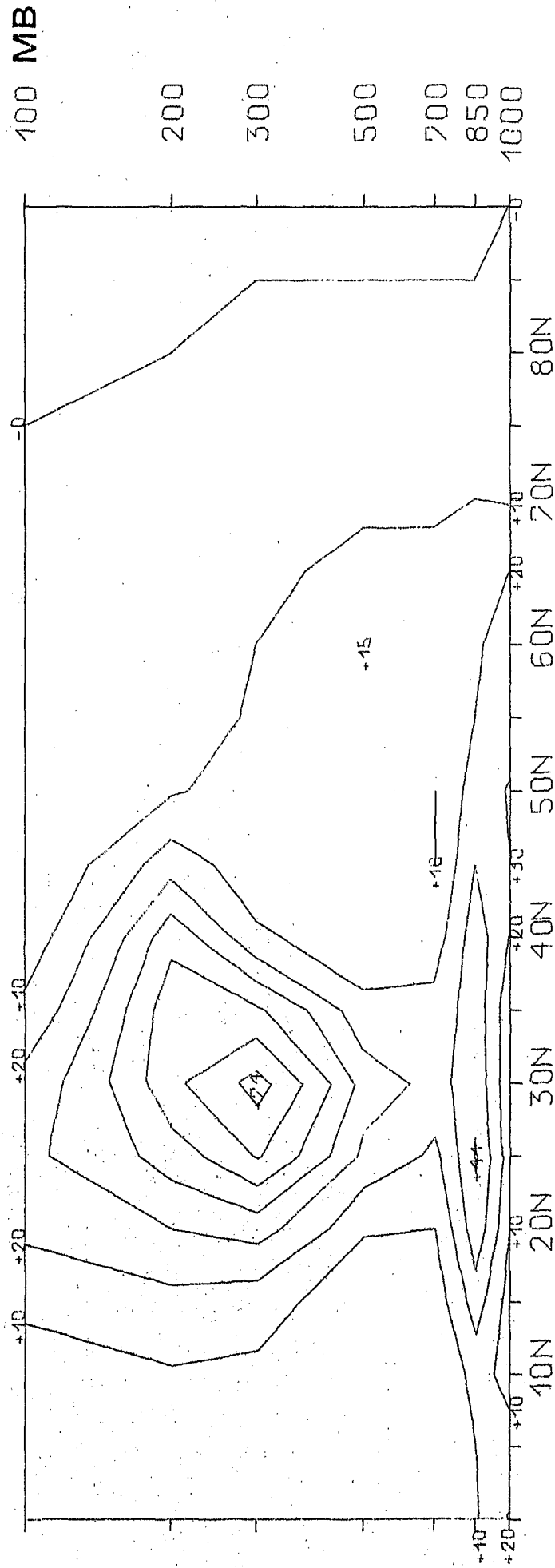
$A_{MSF, 1-3}$ $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 68

KENNZIFFER 43076900



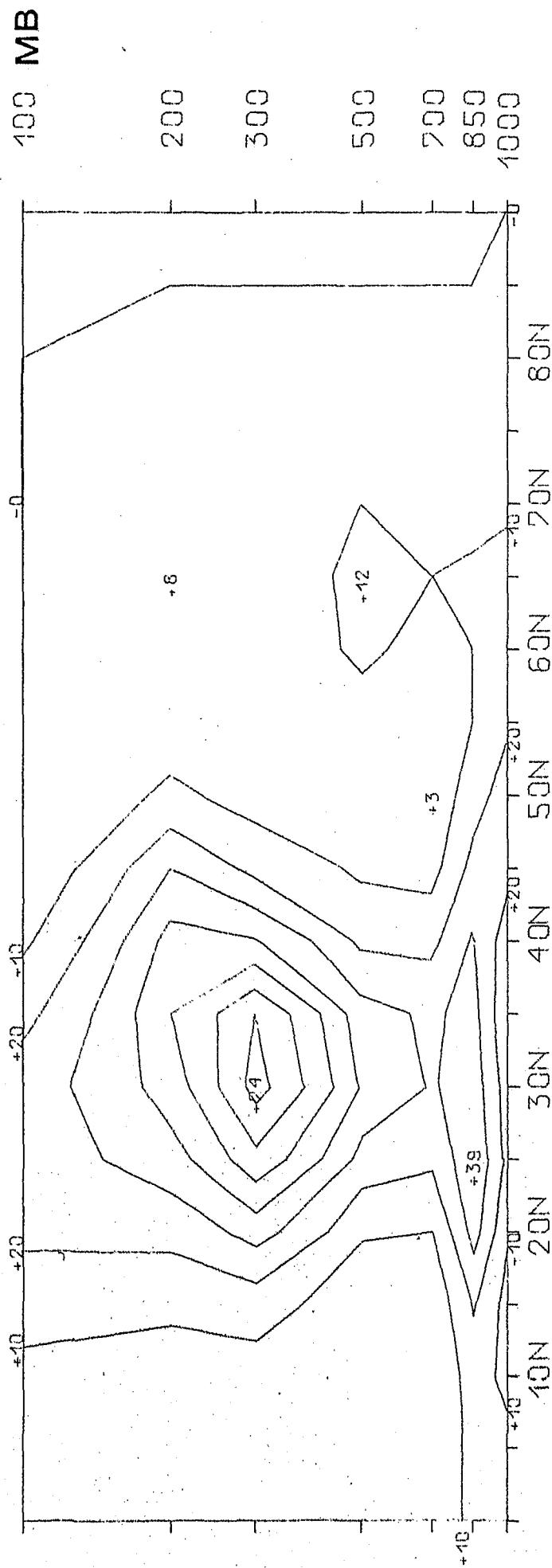
$A_{MSE, 1-3} \cdot 10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 69

KENNZIFFER: 43072000



$A_{MSE, 1-3} \cdot 10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1} \text{ JULI 70}$

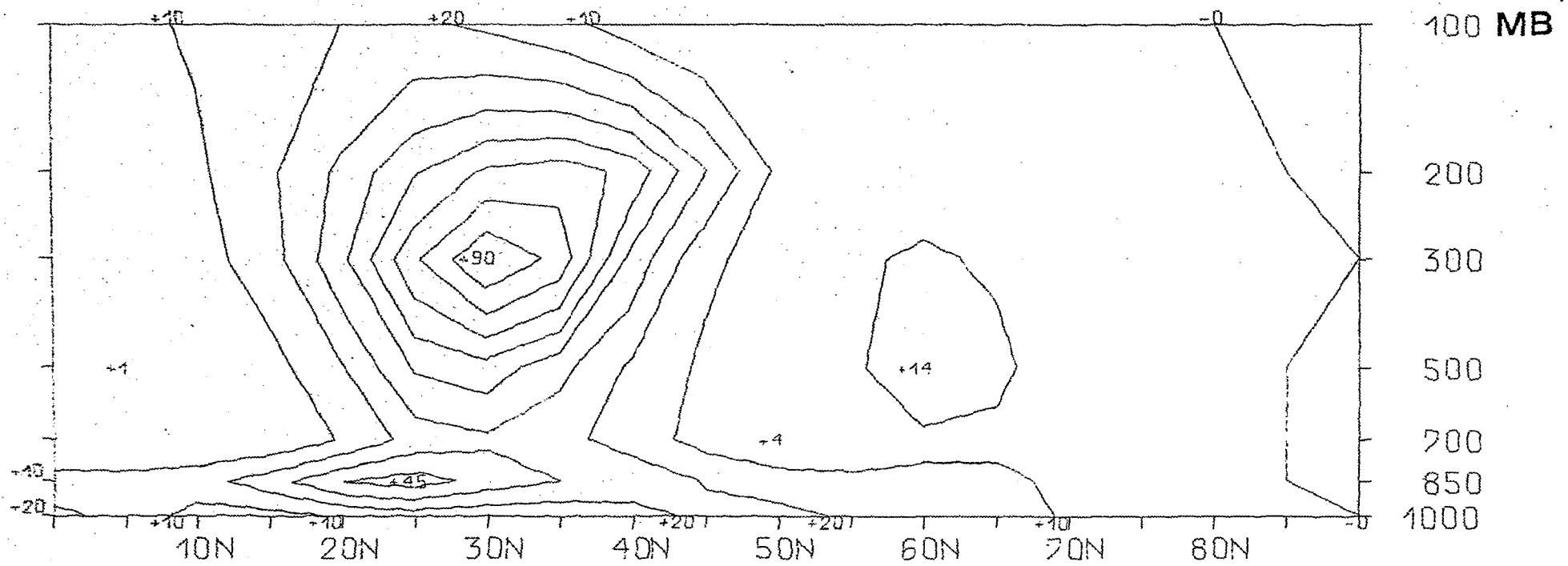
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$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 71

KENNZIFFER:

43077200



A

MST: 1 - 3

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 72

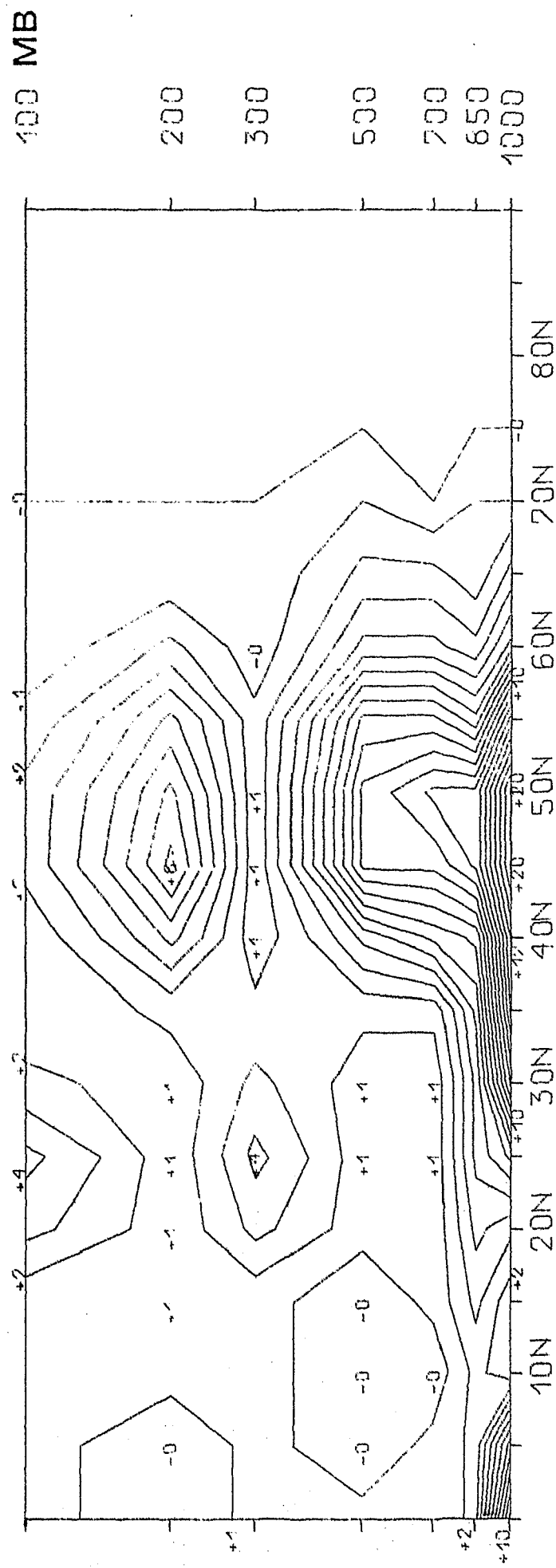
Abb.60

Q

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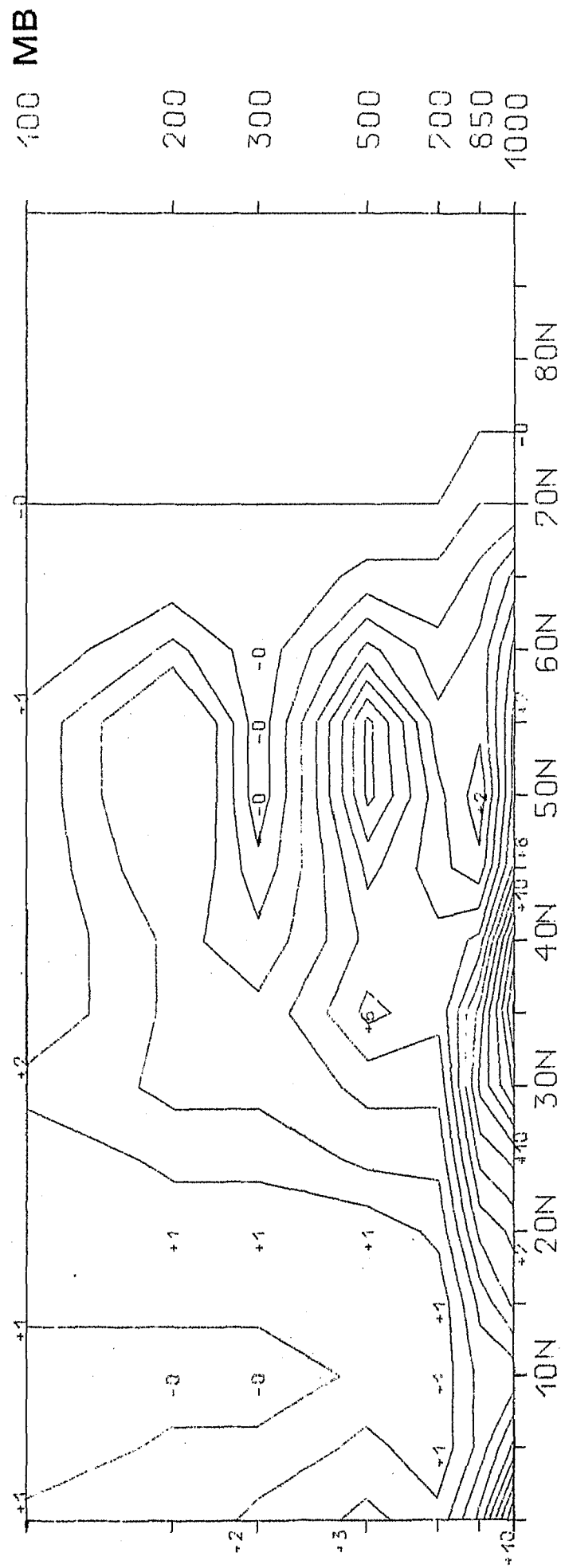
Abb. 61

KENNZIFFER: 39016600



$A_{MSE, 4-8} \cdot 10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.68

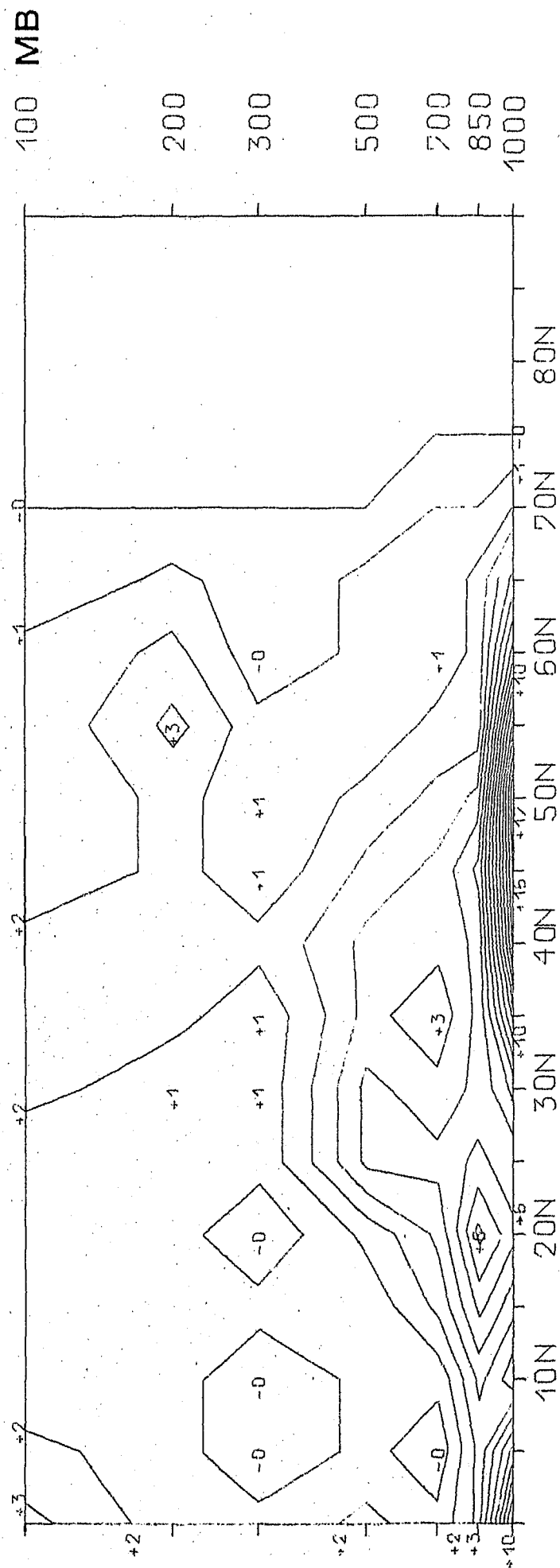
KENNZIFFER: 39016900



$A_{MSE, 4-6} \cdot 10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.69

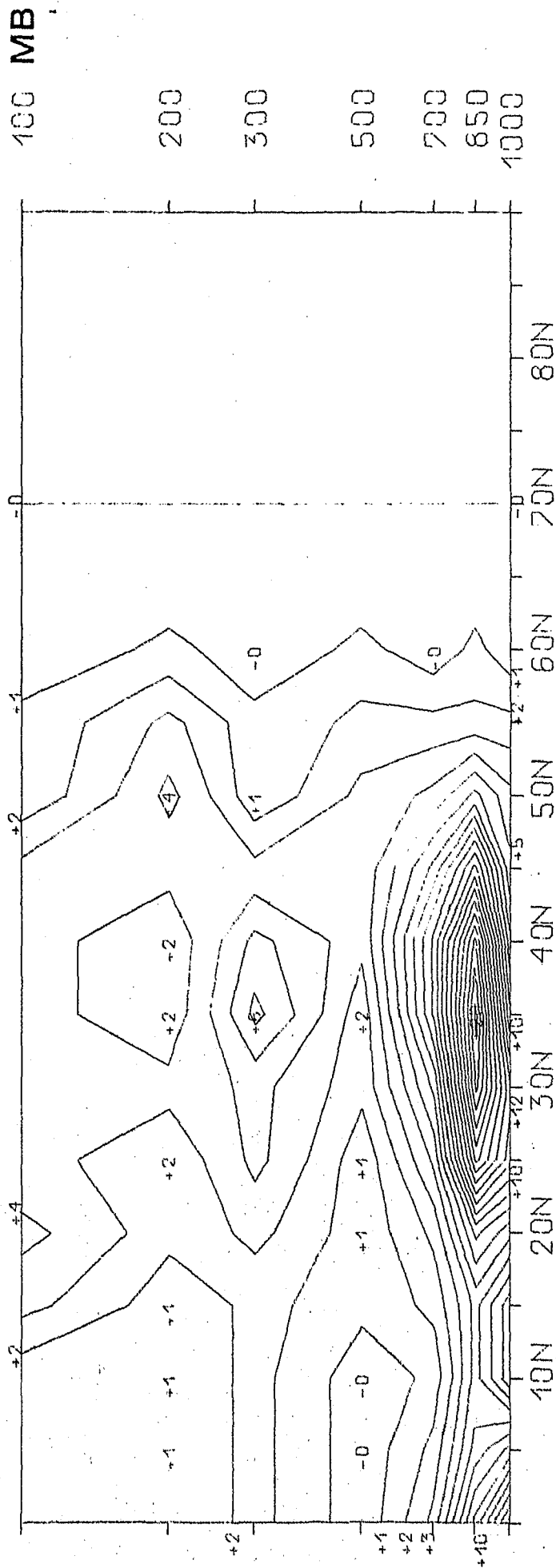
$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.70

KENNZIFFER: 39047100



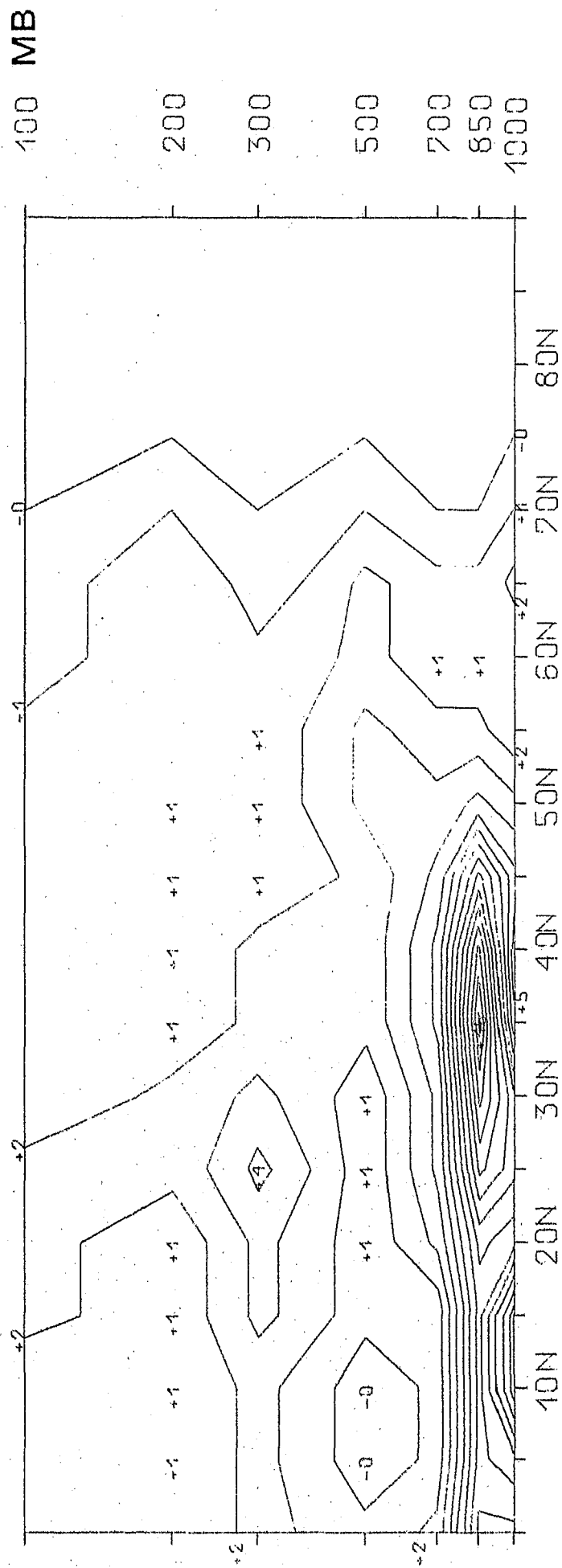
$A_{MSF, 4-6} \cdot 10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1} \text{ JAN.71}$

KENNZIFFER: 39076700



$A_{MSE, 4 - 8} \cdot 10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1} \text{ JULI 67}$

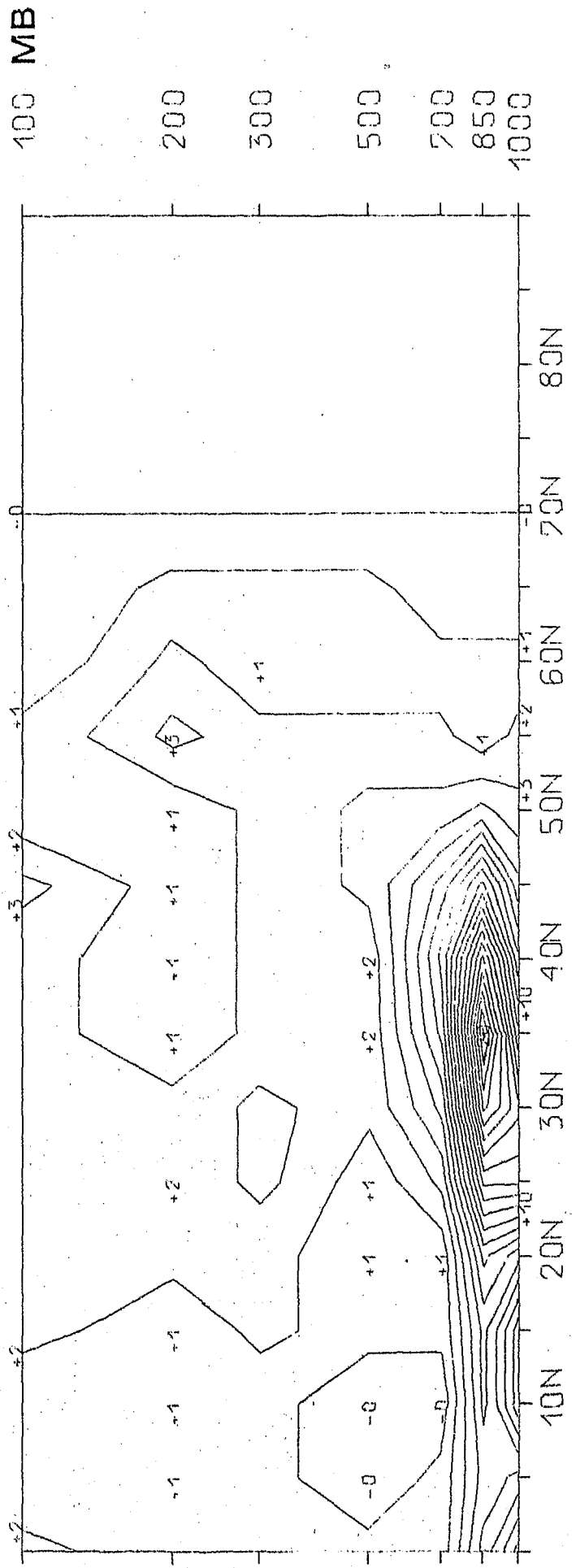
KENNZIFFER: 39076800



$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 68

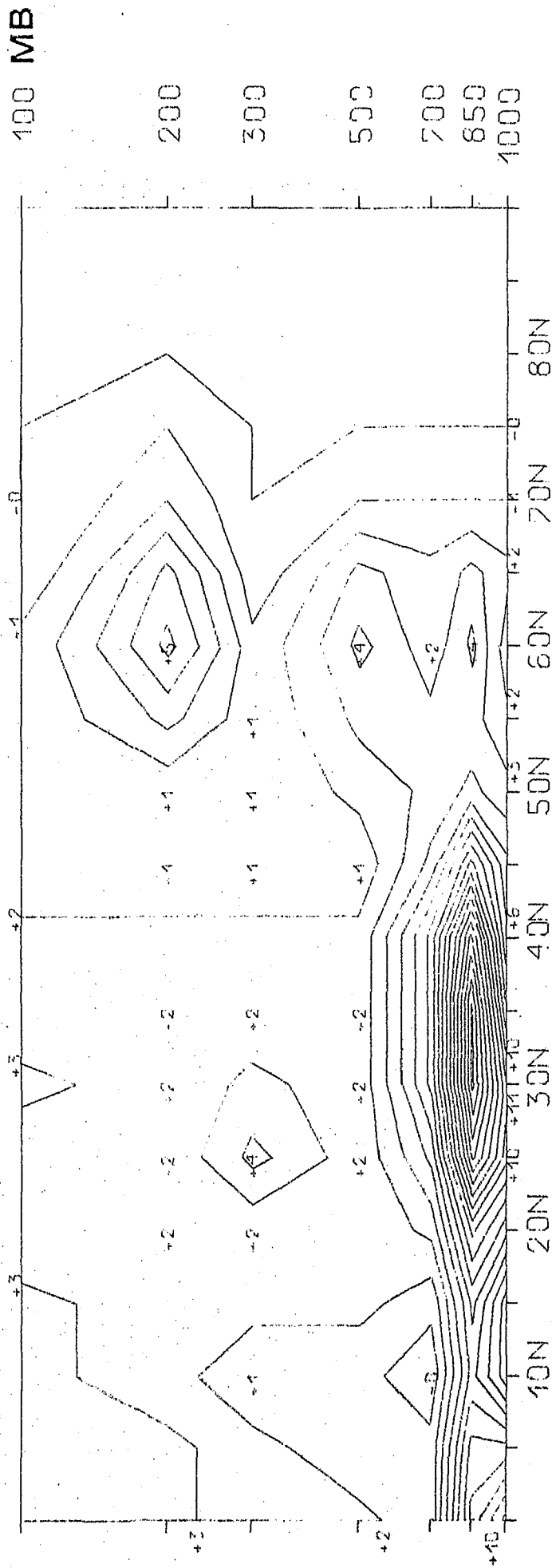
MSF, 4 - 6

KENNZIFFER: 39076900



A $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 69

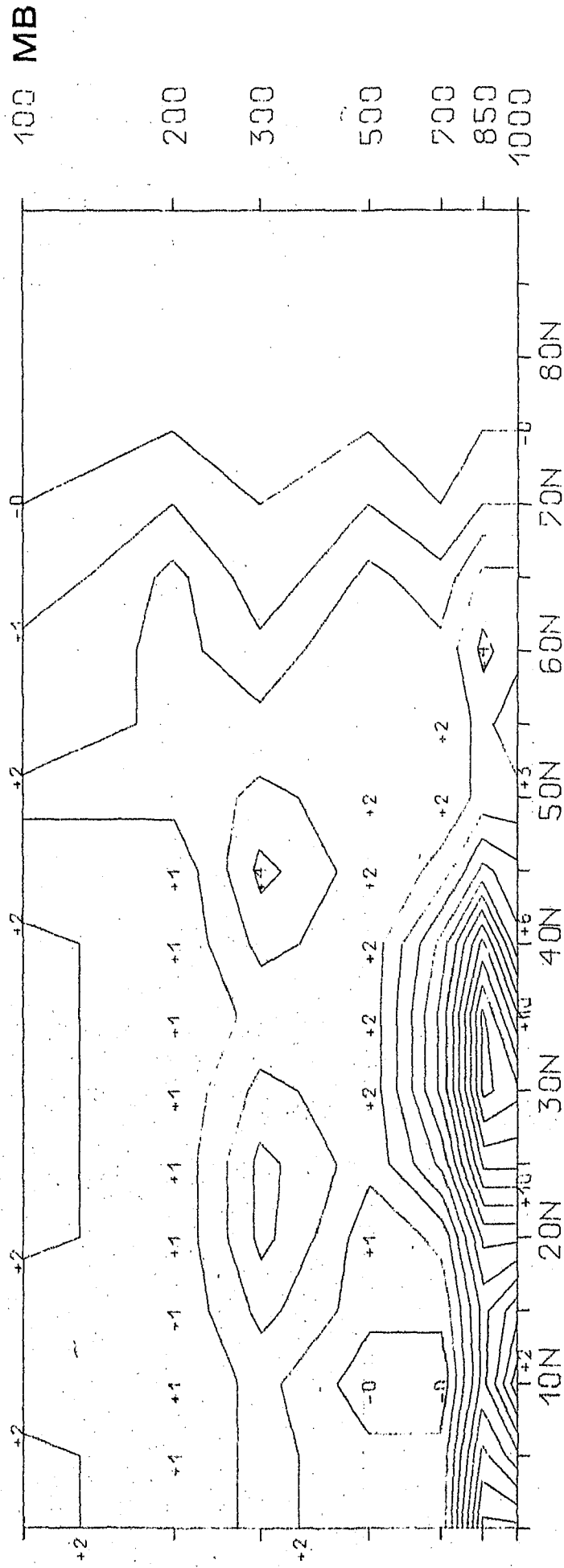
KENNEDY: 39027000



A MSE, 4 - 6

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 70

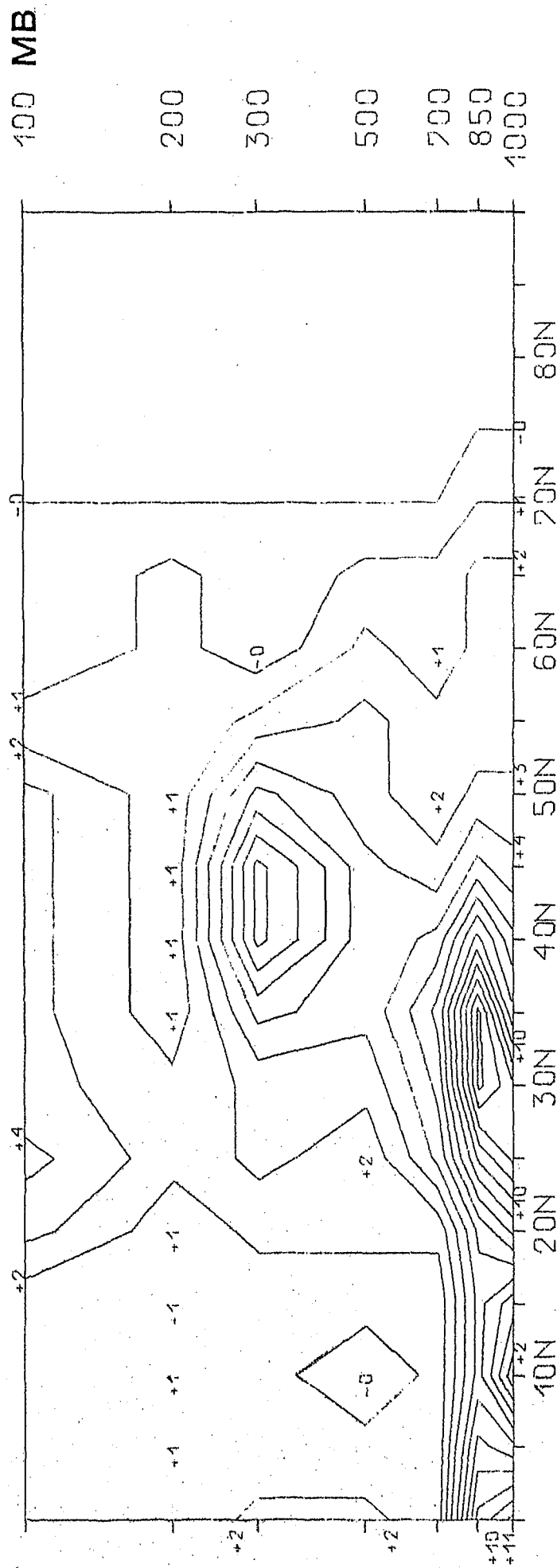
KENNZIFFER 39077100



$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 71

$P_{\text{MSE}, 4 - 8}$

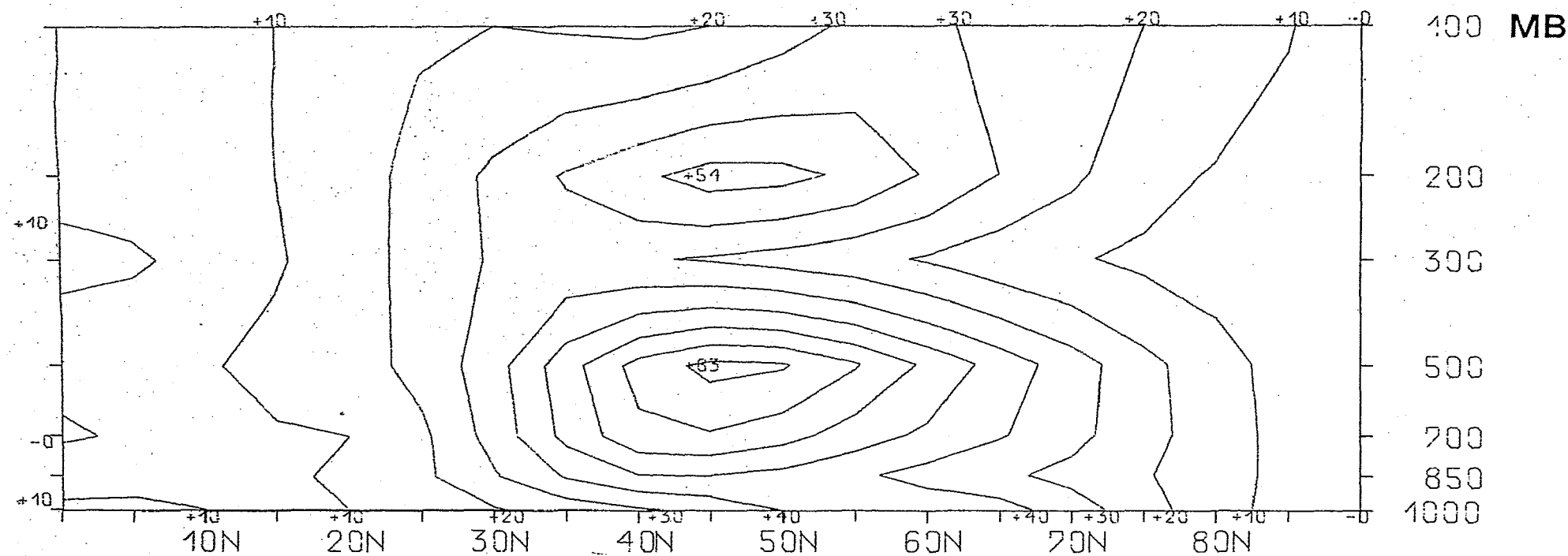
KENNZIFFER: 39077200



$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 72

$A_{\text{MSE}, 4 - 8}$

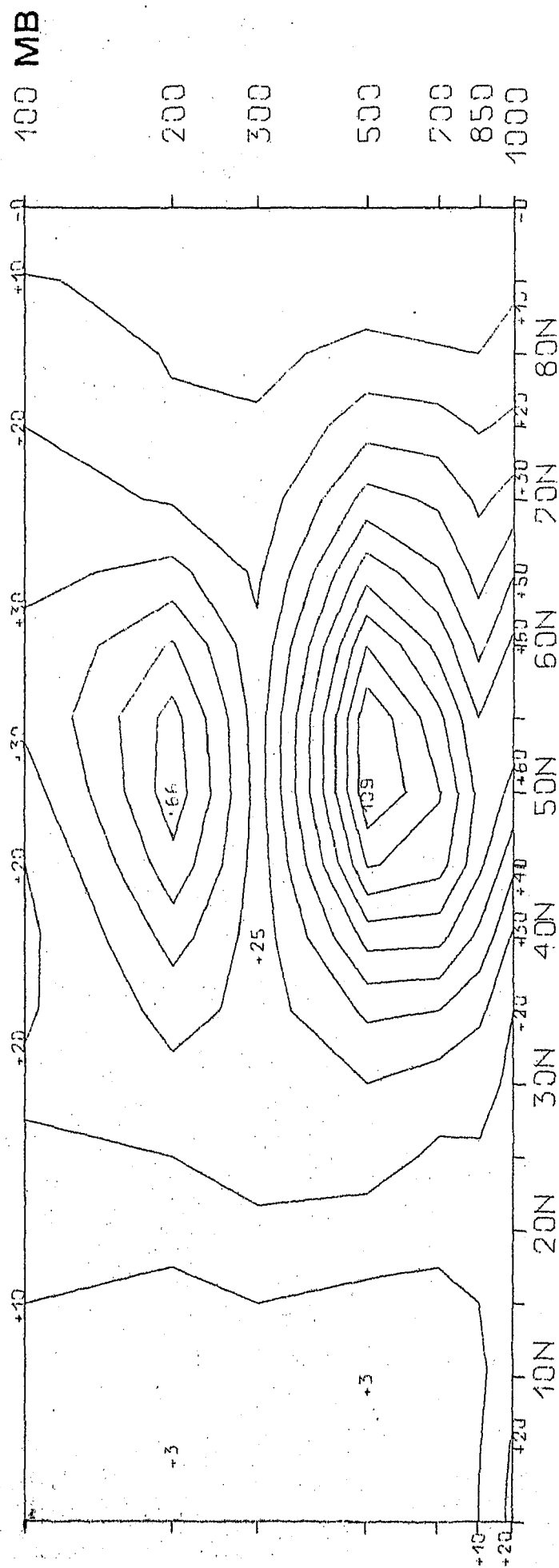
KENNZIFFER: 37016700



A_{TE}

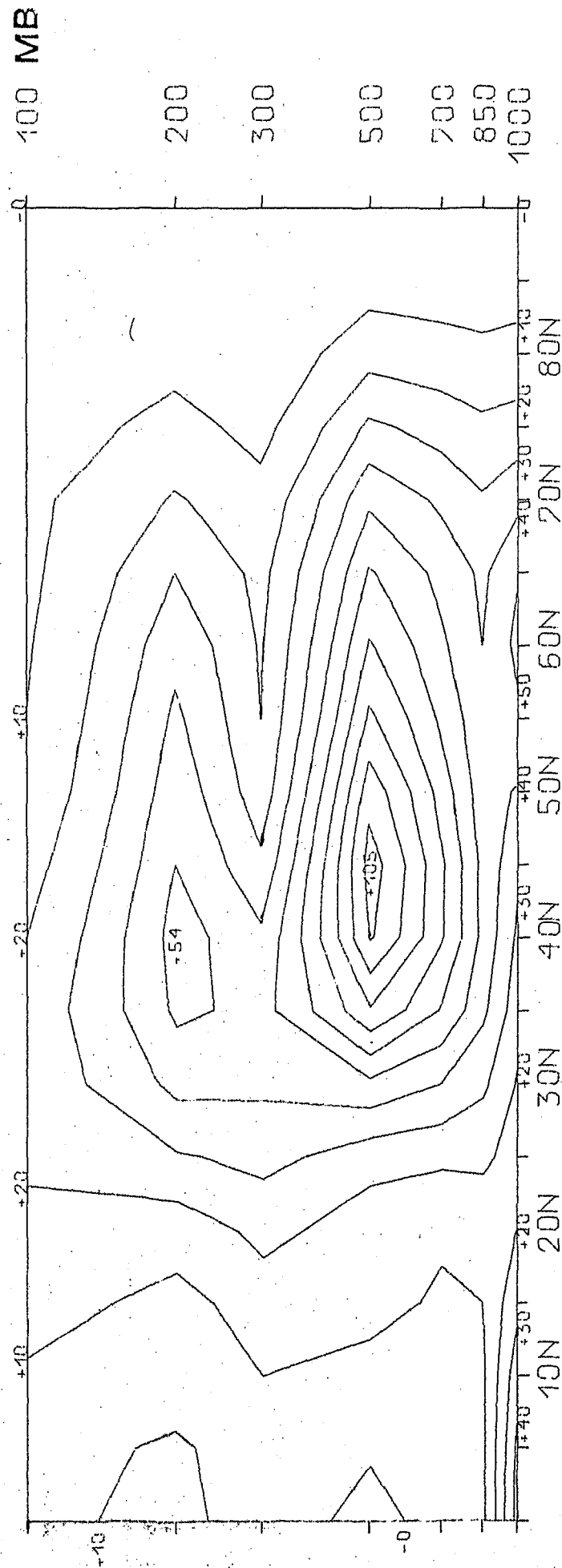
$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN. 67

KENNZIFFER: 32016800



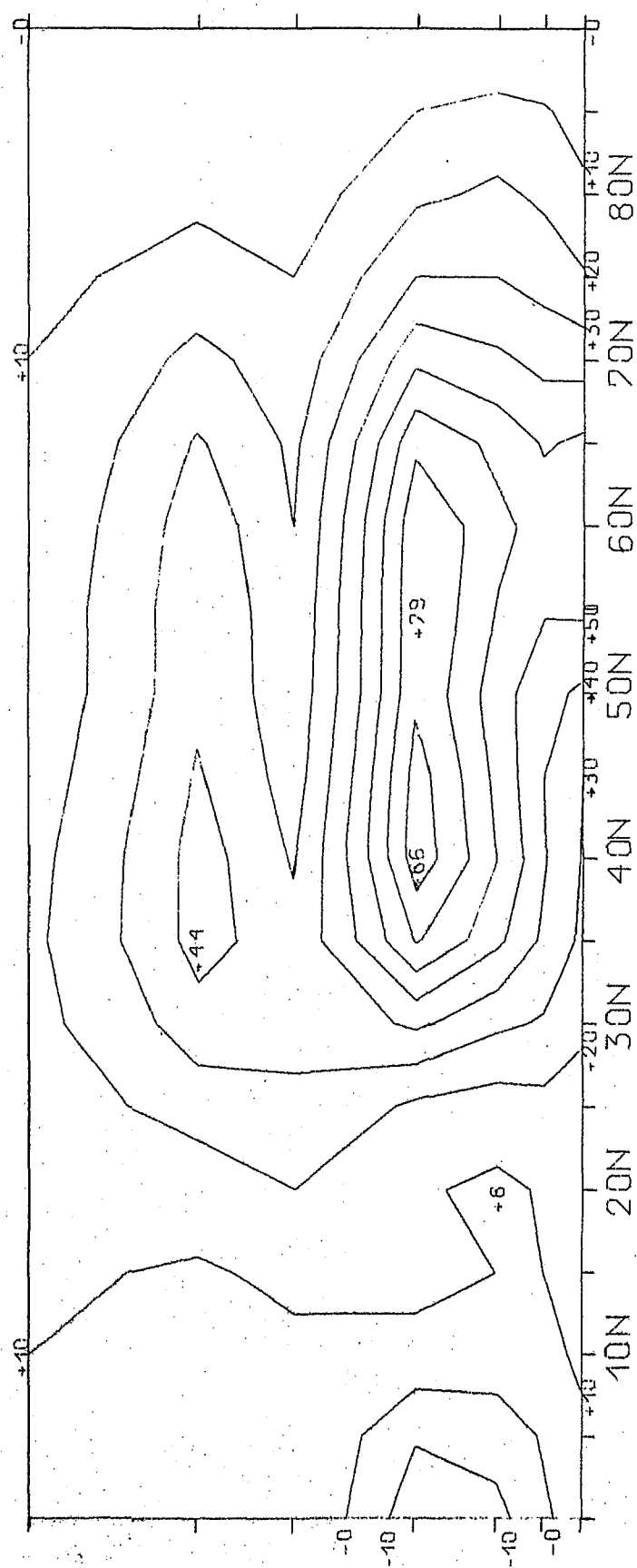
A_{TE} $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.68

KENNZIFFER: 37016900



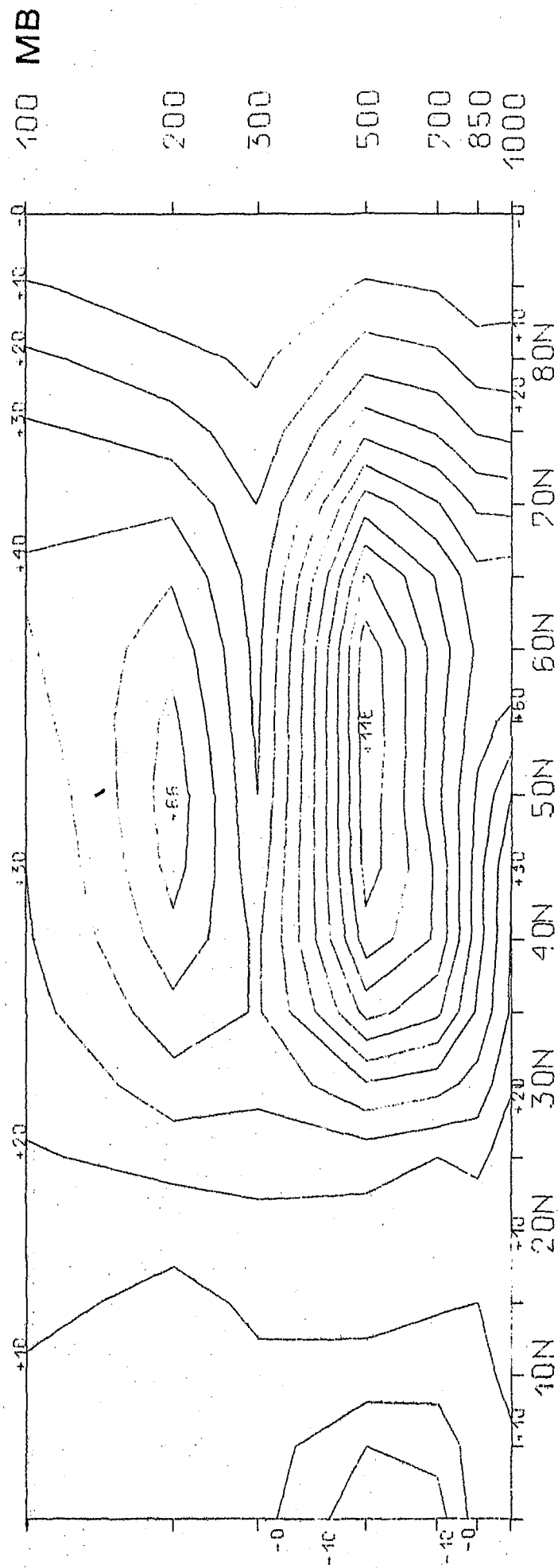
A_{Te} $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.69

KENNZIFFER: 37017000



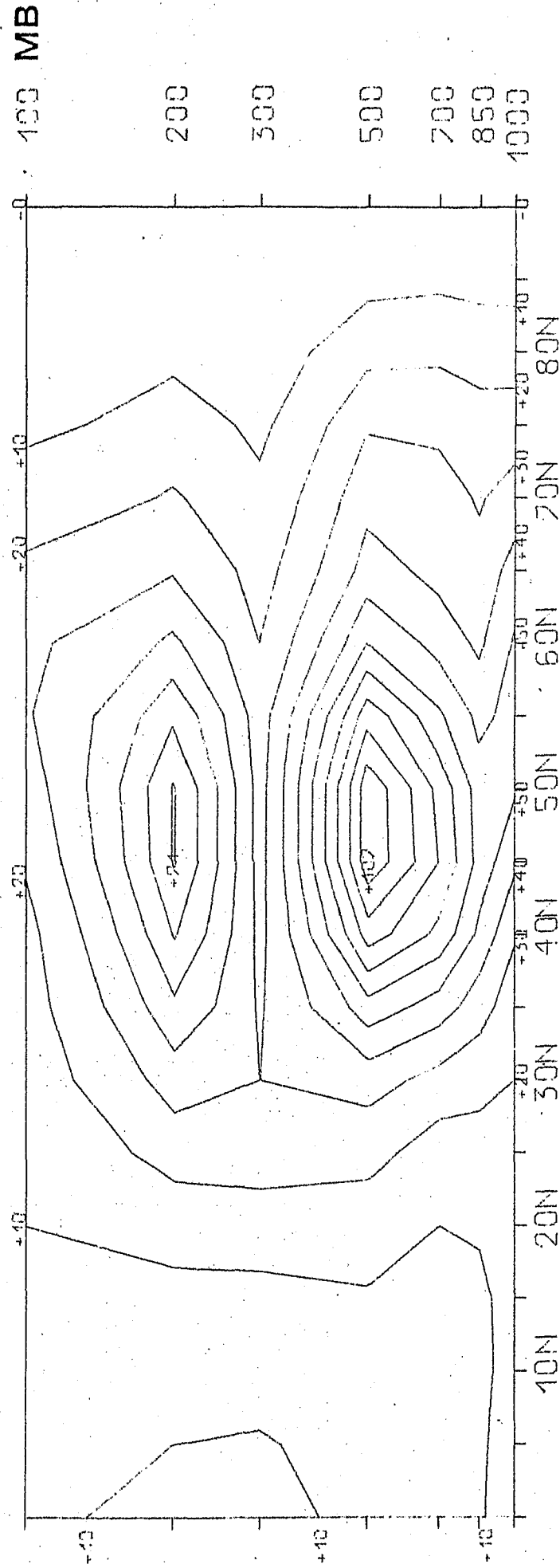
A_{TE} $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.70

KENNZIFFER: 37017100



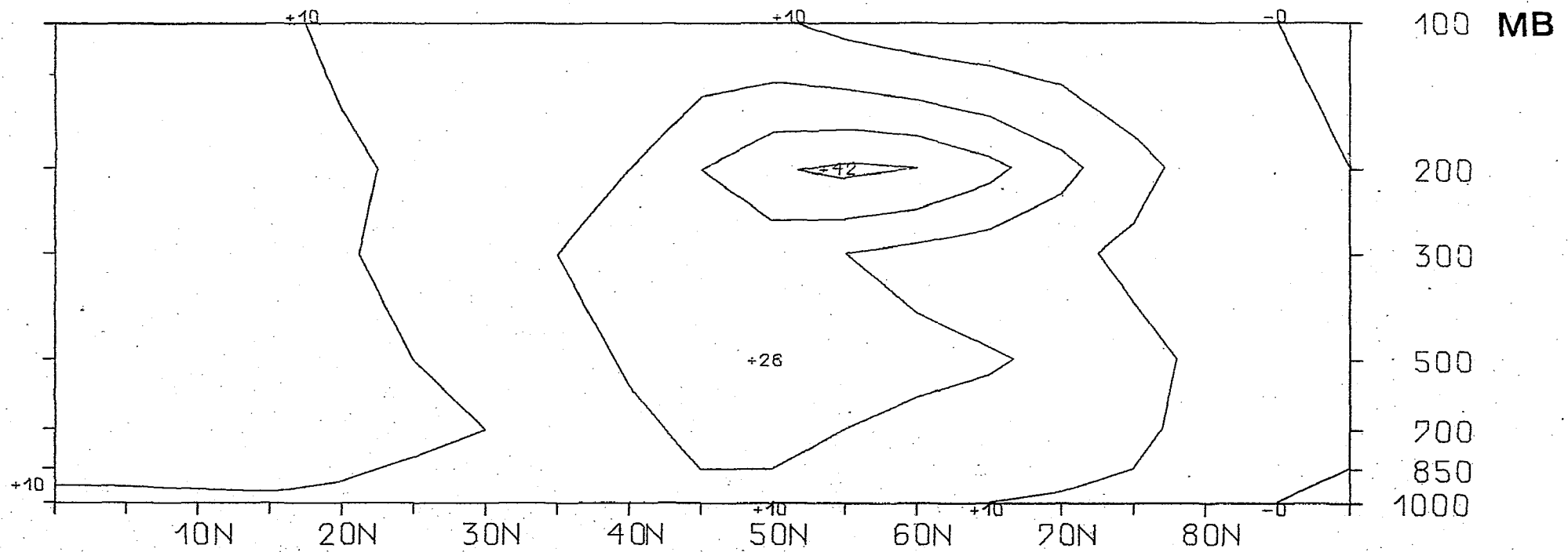
A_{TF} $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.71

KENNZIFFER: 37012200



A_{TE} $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.72

KENNZIFFER: 37076700

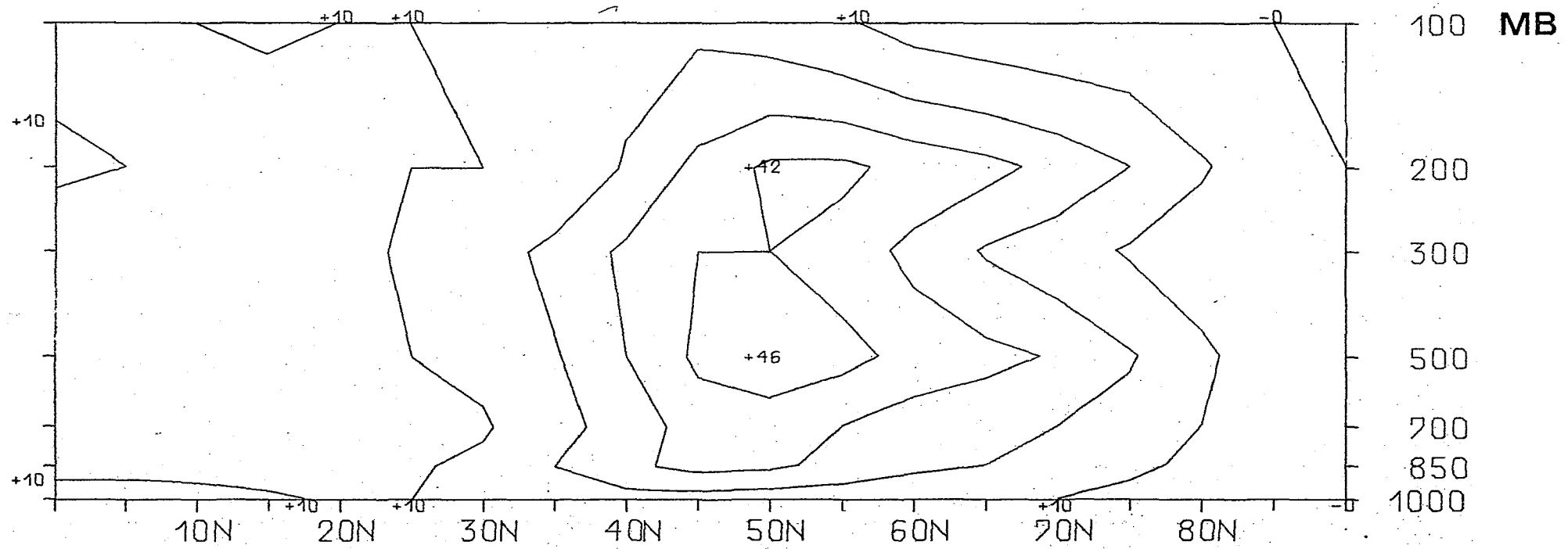


A_{TE}

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1} \text{ JULI 67}$

Abb.79

KENNZIFFER: 37076800



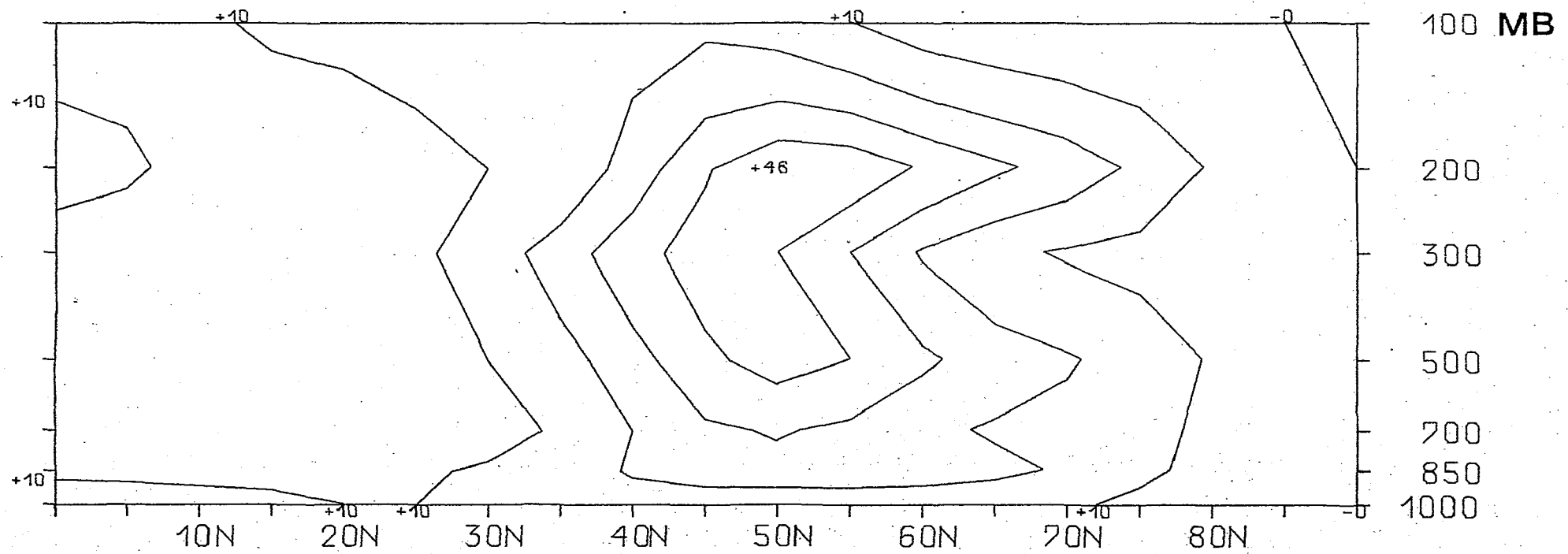
A_{TE}

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 68

Abb.80

KENNZIFFER:

37076900

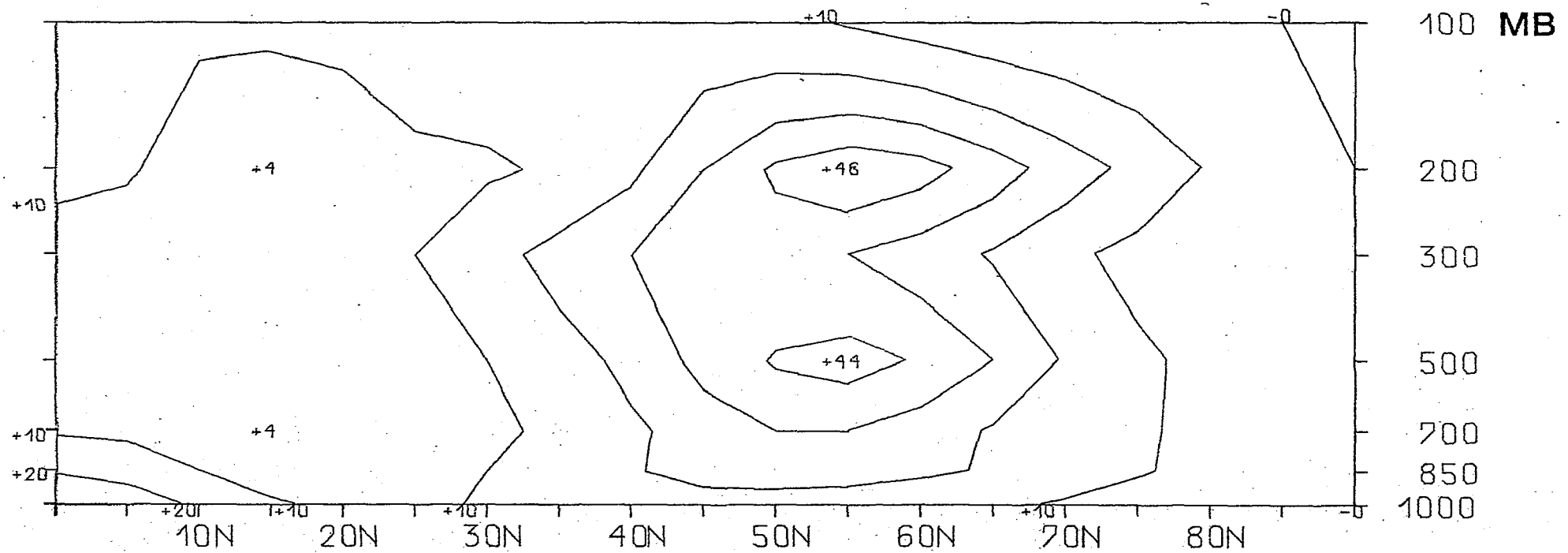


A_{TE}

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1} \text{ JULI 69}$

KENNZIFFER:

37077000

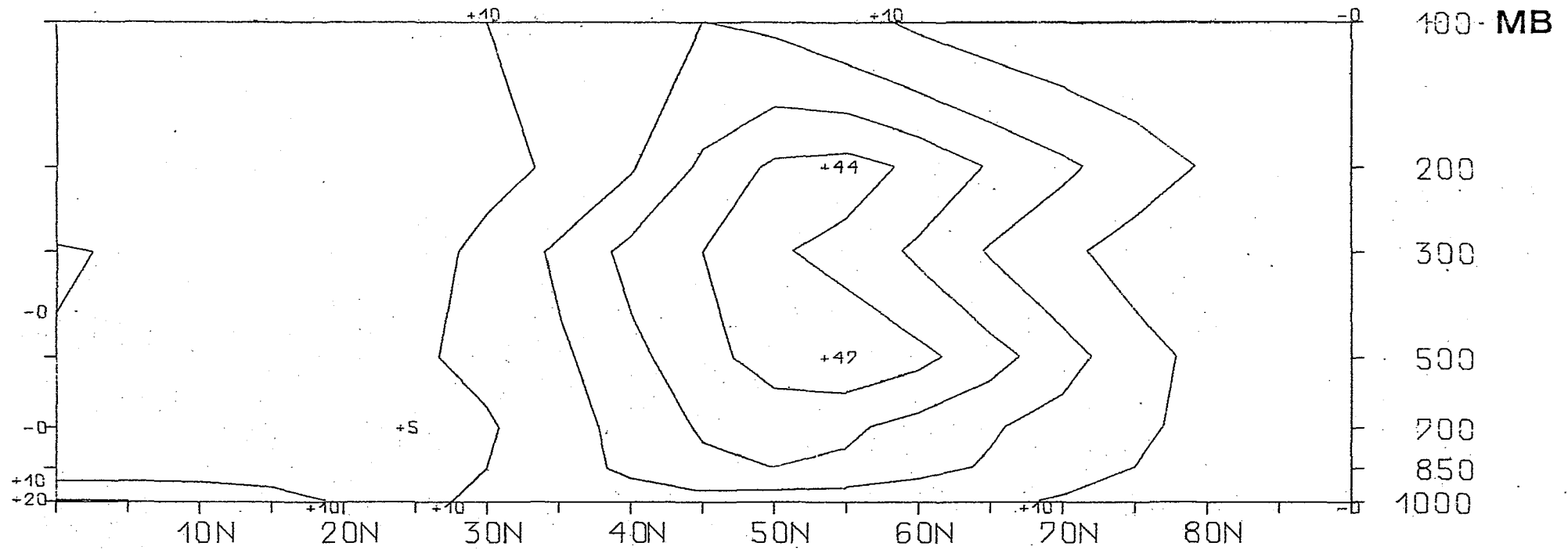


A_{TE}

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 70

KENNZIFFER:

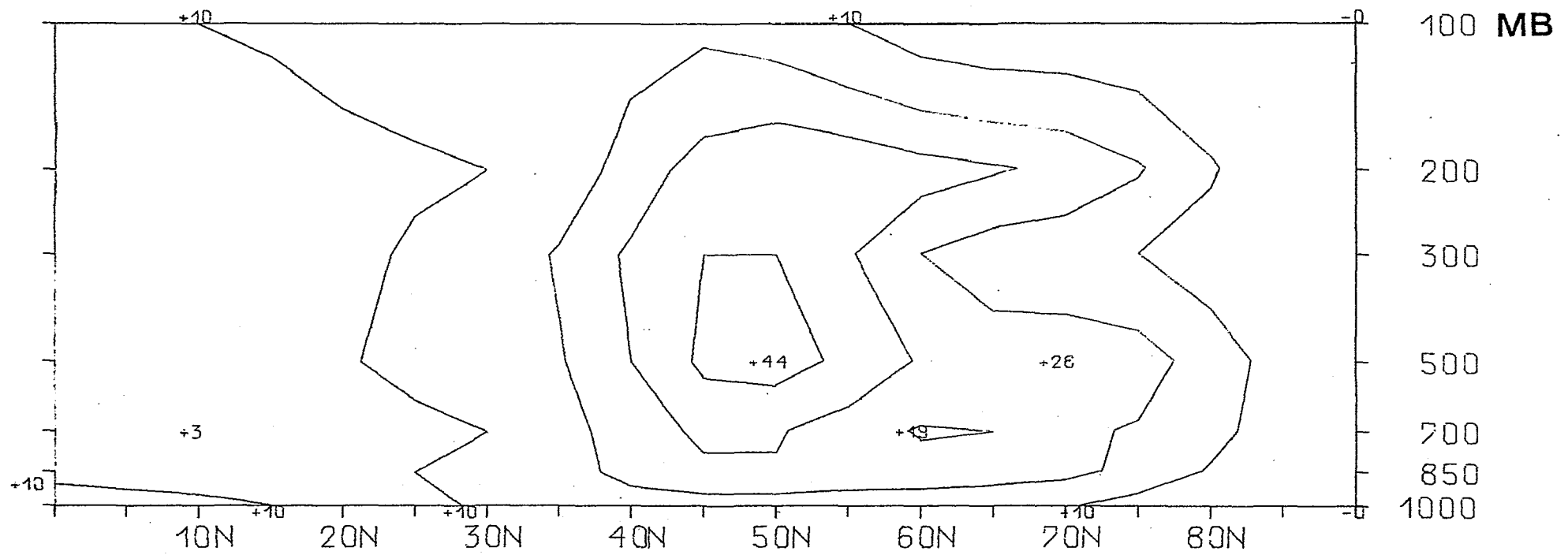
32072100



A_{TE}

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 71

KENNZIFFER: 37077200



A_{TE}

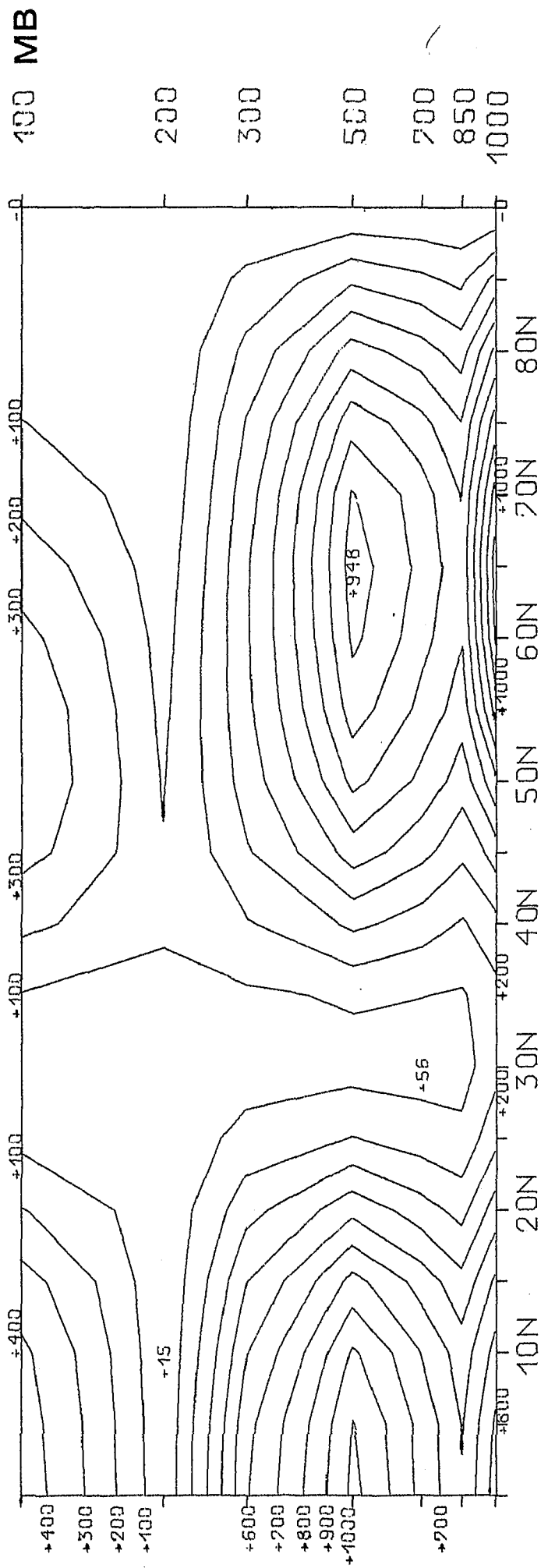
$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1} \text{ JULI 72}$

40316700



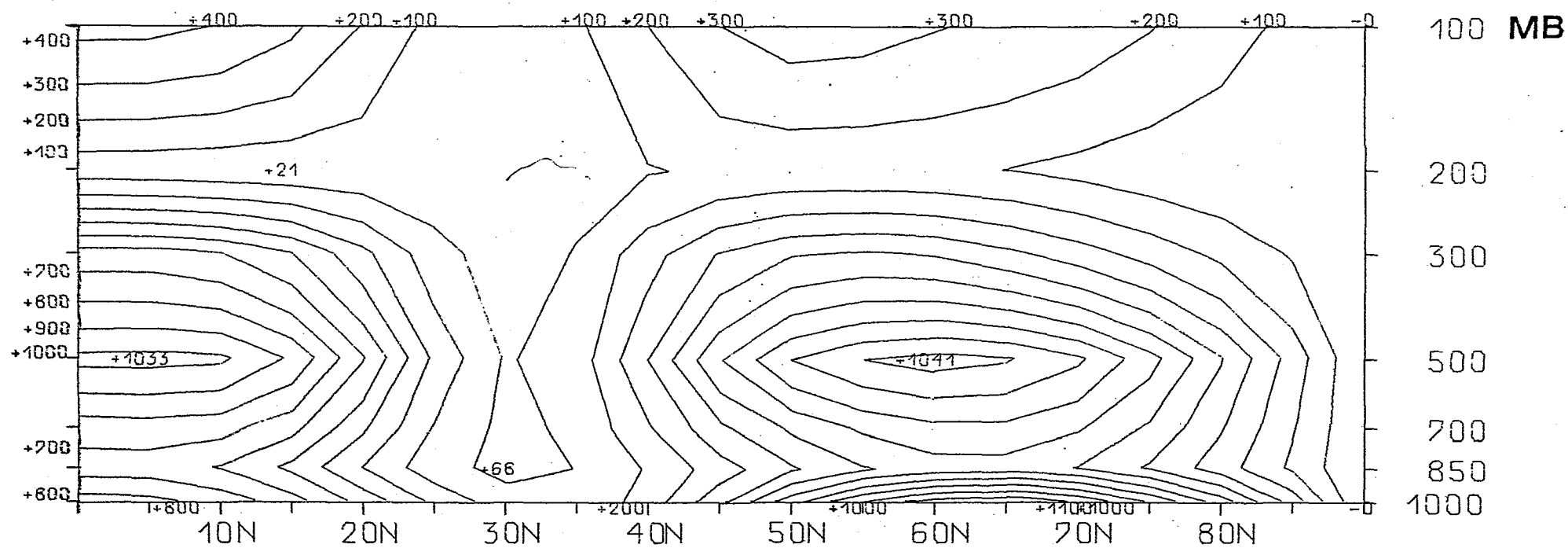
10^{-3} J CM⁻² MB⁻¹ JAN.67

KENNZIFFER: 40016800



A_{TOC} $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.68

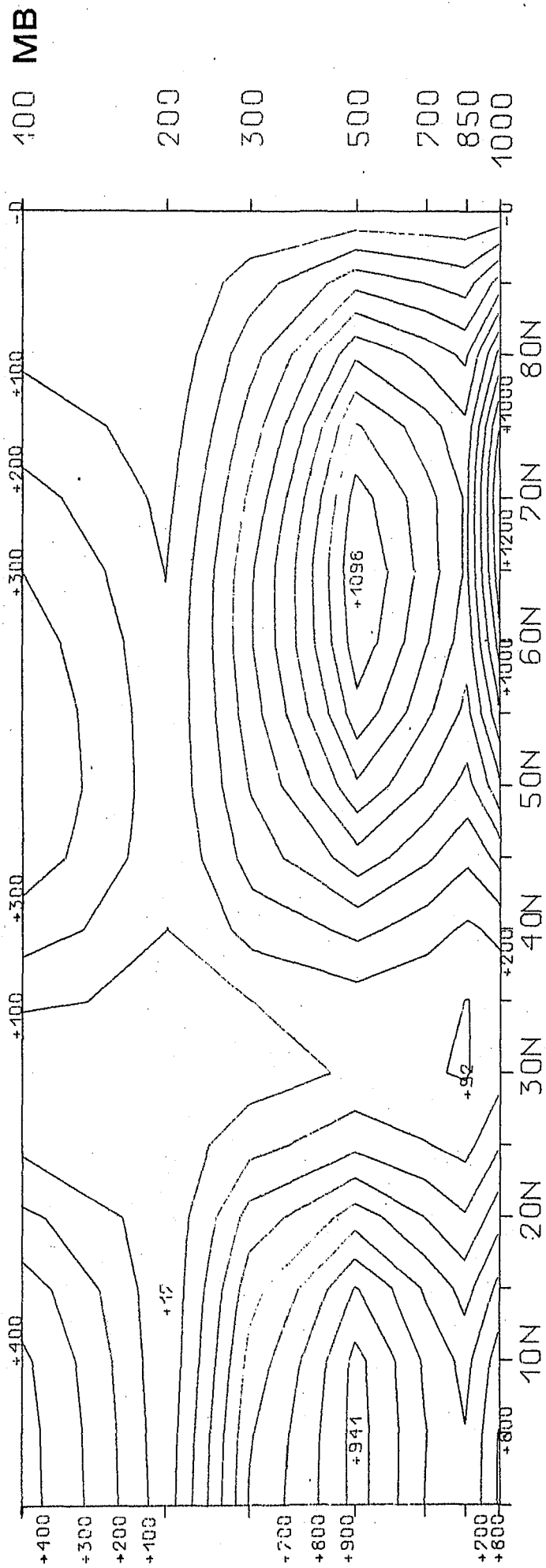
KENNZIFFER: 40017000



A_{TOC}

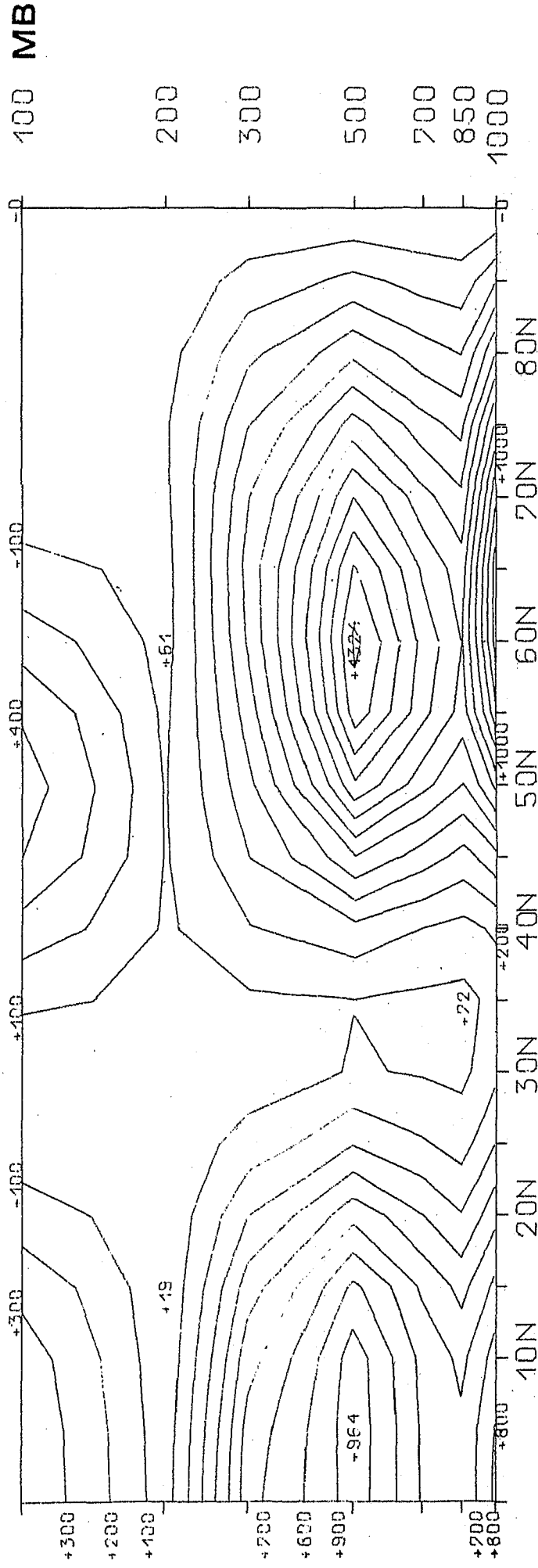
$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.70

KENNZIFFER: 40017100



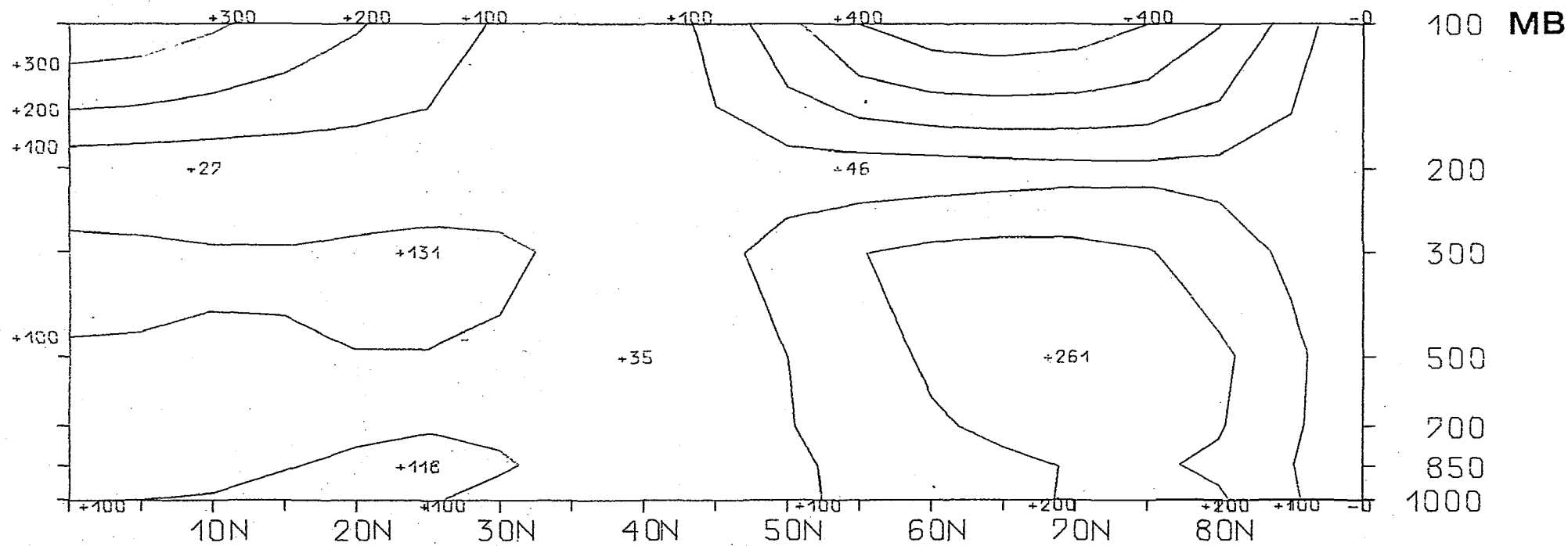
A_{TOC} $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.71

KENNZIFFER: 40017200



A_{TOC} $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JAN.72

KENNZIFFER: 40076700



A_{TOC}

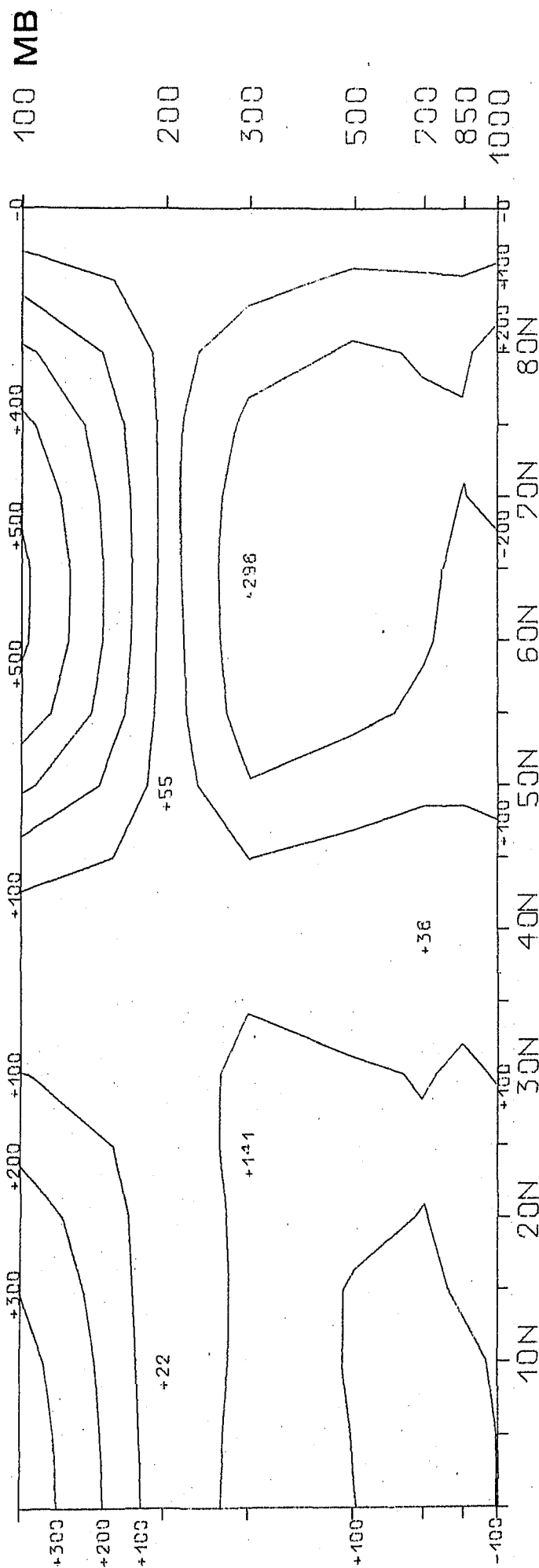
$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1} \text{ JULI 67}$

40076800



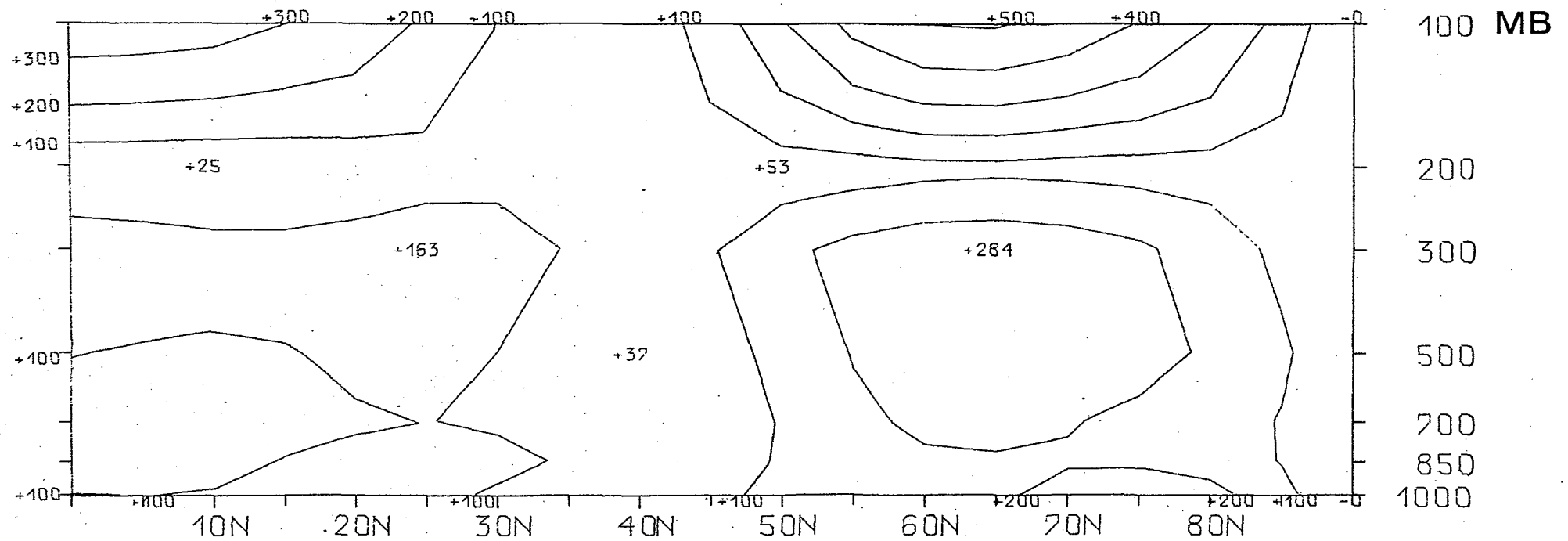
10⁻³ J CM⁻² MB⁻¹ JULI 68

KENNZIFFER: 40076900



A_{roc} $10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 69

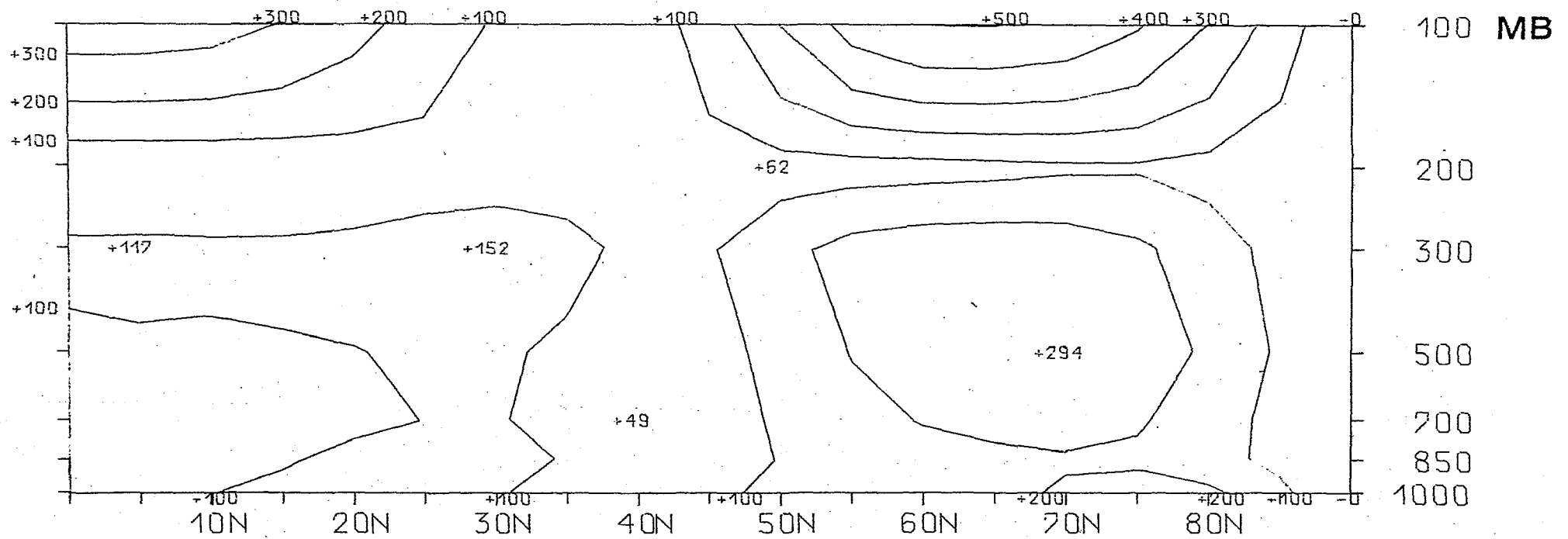
KENNZIFFER: 40077000



A_{TOC}

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 70

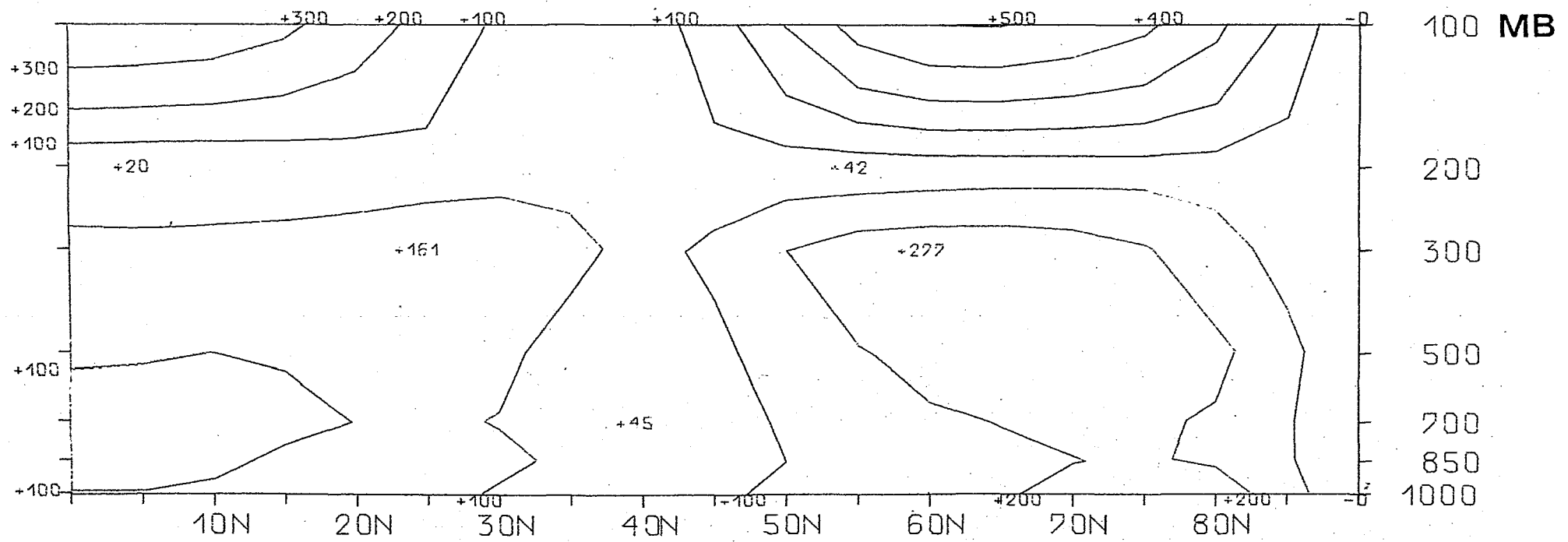
KENNZIFFER: 40077100



A_{TOC}

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1} \text{ JULI 71}$

KENNZIFFER: 40077200



A_{TOC}

$10^{-3} \text{ J CM}^{-2} \text{ MB}^{-1}$ JULI 72